5. Facilitating Behavior Change and Well-being to Improve Health Outcomes: *Standards of Medical Care in Diabetes—2022*

*American Diabetes Association Professional Practice Committee**

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The American Diabetes Association (ADA) "Standards of Medical Care in Diabetes" includes the ADA's current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate quality of care. Members of the ADA Professional Practice Committee, a multidisciplinary expert committee (https://doi.org/10.2337/dc22-SPPC), are responsible for updating the Standards of Care annually, or more frequently as warranted. For a detailed description of ADA standards, statements, and reports, as well as the evidence-grading system for ADA's clinical practice recommendations, please refer to the Standards of Care Introduction (https://doi.org/10.2337/dc22-SINT). Readers who wish to comment on the Standards of Care are invited to do so at professional.diabetes.org/SOC.

Building positive health behaviors and maintaining psychological well-being are foundational for achieving diabetes treatment goals and maximizing quality of life (1,2). Essential to achieving these goals are diabetes self-management education and support (DSMES), medical nutrition therapy (MNT), routine physical activity, smoking cessation counseling when needed, and psychosocial care. Following an initial comprehensive medical evaluation (see Section 4, "Comprehensive Medical Evaluation and Assessment of Comorbidities," https://doi.org/10.2337/dc22-S004), patients and providers are encouraged to engage in person-centered collaborative care (3–6), which is guided by shared decision-making in treatment regimen selection; facilitation of obtaining medical, psychosocial, and technology resources as needed; and shared monitoring of agreed-upon regimens and behavioral goals (7,8). Reevaluation during routine care should include assessment of medical, behavioral, and mental health outcomes, especially during times of deterioration in health and well-being.

DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT

Recommendations

5.1 In accordance with the national standards for diabetes self-management education and support, all people with diabetes should participate in diabetes self-management education and receive the support needed to facilitate the knowledge, decision-making, and skills mastery for diabetes self-care. **A**

A complete list of members of the American Diabetes Association Professional Practice Committee can be found at https://doi.org/10.2337/dc22-SPPC.

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5.2 There are four critical times to evaluate the need for diabetes self-management education to promote skills acquisition in support of regimen implementation, medical nutrition therapy, and well-being: at diagnosis, annually and/or when not meeting treatment targets, when complicating factors develop (medical, physical, psychosocial), and when transitions in life and care occur. **E**

5.3 Clinical outcomes, health status, and well-being are key goals of diabetes self-management education and support that should be measured as part of routine care. **C**

5.4 Diabetes self-management education and support should be patient-centered, may be offered in group or individual settings, and should be communicated with the entire diabetes care team. **A**

5.5 Digital coaching and digital self-management interventions can be effective methods to deliver diabetes self-management education and support. **B**

5.6 Because diabetes self-management education and support can improve outcomes and reduce costs **B**, reimbursement by third-party payers is recommended. **C**

5.7 Barriers to diabetes self-management education and support exist at the health system, payer, provider, and patient levels. **A** Efforts to identify and address barriers to diabetes self-management education and support should be prioritized. **E**

5.8 Some barriers to diabetes self-management education and support access may be mitigated through telemedicine approaches. **B**

DSMES services facilitate the knowledge, decision-making, and skills mastery necessary for optimal diabetes self-care and incorporate the needs, goals, and life experiences of the person with diabetes. The overall objectives of DSMES are to support informed decision-making, self-care behaviors, problem-solving, and active collaboration with the health care team to improve clinical outcomes, health status, and well-being in a cost-effective manner (2). Providers are encouraged to consider the burden of treatment (9) and the patient's level of confidence and self-efficacy for management behaviors as well as the level of social and family support when providing DSMES. Patient engagement in self-management behaviors and their effects on clinical outcomes, health status, and quality of life, as well as the psychosocial factors impacting the person's ability to self-manage, should be monitored as part of routine clinical care. A randomized controlled trial (RCT) testing a decision-making education and skill-building program (10) showed that addressing these targets improved health outcomes in a population in need of health care resources. Furthermore, following a DSMES curriculum improves quality of care (11).

Additionally, in response to the growing literature that associates potentially judgmental words with increased feelings of shame and guilt, health care professionals are encouraged to consider the impact that language has on building therapeutic relationships and to choose positive, strength-based words and phrases that put people first (4,12). Please see Section 4, "Comprehensive Medical Evaluation and Assessment of Comorbidities" (https://doi.org/10.2337/dc22-S004), for more on use of language.

Guidelines for DSMES are based on evidence of benefit (2,13). Specifically, DSMES helps people with diabetes to identify and implement effective self-management strategies and cope with diabetes at four critical time points (see below) (2). Ongoing DSMES helps people with diabetes to maintain effective self-management throughout the life course as they encounter new challenges and as advances in treatment become available (14).

There are four critical time points when the need for DSMES should be evaluated by the medical care provider and/or multidisciplinary team, with referrals made as needed (2):

1. At diagnosis
2. Annually and/or when not meeting treatment targets
3. When complicating factors (health conditions, physical limitations, emotional factors, or basic living needs) develop that influence self-management
4. When transitions in life and care occur

DSMES focuses on supporting patient empowerment by providing people with diabetes the tools to make informed self-management decisions (15). Diabetes care requires an approach that places the person with diabetes and their family and/or support system at the center of the care model, working in collaboration with health care professionals. Patient-centered care is respectful of and responsive to individual preferences, needs, and values. It ensures that patient values guide all decision-making (16).

Evidence for the Benefits

Studies have found that DSMES is associated with improved diabetes knowledge and self-care behaviors (16,17), lower A1C (16,18–21), lower self-reported weight (22), improved quality of life (19,23), reduced all-cause mortality risk (24), positive coping behaviors (5,25), and reduced health care costs (26–28). Better outcomes were reported for DSMES interventions that were more than 10 h over the course of 6–12 months (20), included ongoing support (14,29), were culturally (30,31) and age appropriate (32,33), were tailored to individual needs and preferences, and addressed psychosocial issues and incorporated behavioral strategies (15,25,34,35). Individual and group approaches are effective (36,37), with a slight benefit realized by those who engage in both (20).

Emerging evidence demonstrates the benefit of telemedicine or internet-based DSMES services for diabetes prevention and the management of type 2 diabetes (38–45).

Technologies such as mobile apps, simulation tools, digital coaching, and digital self-management interventions can be used to deliver DSMES (46,47). These methods provide comparable or even improved outcomes compared with traditional in-person care (48). Greater A1C reductions are demonstrated with increased patient engagement (49), although data from trials is preliminary in nature and quite heterogeneous.

Technology-enabled diabetes self-management solutions improve A1C most effectively when there is two-way communication between the patient and the health care team, individualized feedback, use of patient-generated health data, and education (40). Incorporating a systematic approach for technology assessment, adoption, and integration into the care plan may help ensure equity in access and standardized application of technology-enabled solutions (8,50–53).

Current research supports diabetes care and education specialists including nurses, dietitians, and pharmacists as providers of DSMES who may also tailor curriculum to the person's needs (54–56). Members of the DSMES team should have specialized clinical knowledge in diabetes and behavior change principles. In addition, a diabetes care and education specialist needs to be knowledgeable about technology-enabled services and may serve as a technology champion within their practice (50). Certification as a diabetes care and education specialist (see www.cbdce.org/) and/or board certification in advanced diabetes management (see www.diabeteseducator.org/education/certification/bc_adm) demonstrates an individual's specialized training in and understanding of diabetes management and support (13), and engagement with qualified providers has been shown to improve disease-related outcomes. Additionally, there is growing evidence for the role of community health workers (57,58), as well as peer (57–62) and lay leaders (63), in providing ongoing support.

Evidence suggests people with diabetes who completed more than 10 h of DSMES over the course of 6–12 months and those who participated on an ongoing basis had significant reductions in mortality (24) and A1C (decrease of 0.57%) (20) compared with those who spent less time with a diabetes care and education specialist. Given individual needs and access to resources, a variety of culturally adapted DSMES programs need to be offered in a variety of settings. Use of technology to facilitate access to DSMES services, support self-management decisions, and decrease therapeutic inertia suggests that these approaches need broader adoption.

DSMES is associated with an increased use of primary care and preventive services (26,52,64) and less frequent use of acute care and inpatient hospital services (22). Patients who participate in DSMES are more likely to follow best practice treatment recommendations, particularly among the Medicare population, and have lower Medicare and insurance claim costs (27,64). Despite these benefits, reports indicate that only 5–7% of individuals eligible for DSMES through Medicare or a private insurance plan actually receive it (65,66). Barriers to DSMES exist at the health system, payer, provider, and patient levels. This low participation may be due to lack of referral or other identified barriers such as logistical issues (accessibility, timing, costs) and the lack of a perceived benefit (66). Health system, programmatic, and payer barriers include lack of administrative leadership support, limited numbers of DSMES providers, not having referral to DSMES services effectively embedded in the health system service structure, and limited reimbursement rates (67). Thus, in addition to educating referring providers about the benefits of DSMES and the critical times to refer, efforts need to be made to identify and address all of the various potential barriers (2). Alternative and innovative models of DSMES delivery (47) need to be explored and evaluated, including the integration of technology-enabled diabetes and cardiometabolic health services (8,50).

Reimbursement

Medicare reimburses DSMES when that service meets the national standards (2,13) and is recognized by the American Diabetes Association (ADA) through the Education Recognition Program (https://professional.diabetes.org/diabetes-education) or Association of Diabetes Care & Education Specialists. DSMES is also covered by most health insurance plans. Ongoing support has been shown to be instrumental for improving outcomes when it is implemented after the completion of education services. DSMES is frequently reimbursed when performed in person. However, although DSMES can also be provided via phone calls and telehealth, these remote versions may not always be reimbursed. Some barriers to DSMES access may be mitigated through telemedicine approaches. Changes in reimbursement policies that increase DSMES access and utilization will result in a positive impact to beneficiaries' clinical outcomes, quality of life, health care utilization, and costs (68–70). During the time of the coronavirus disease 2019 (COVID-19) pandemic, reimbursement policies have changed (professional.diabetes.org/content-page/dsmes-and-mnt-during-covid-19-national-pandemic), and these changes may provide a new reimbursement paradigm for future provision of DSMES through telehealth channels.

MEDICAL NUTRITION THERAPY

Please refer to the ADA consensus report "Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report" for more information on nutrition therapy (56). For many individuals with diabetes, the most challenging part of the treatment plan is determining what to eat. There is not a "one-size-fits-all" eating pattern for individuals with diabetes, and meal planning should be individualized. Nutrition therapy plays an integral role in overall diabetes management, and each person with diabetes should be actively engaged in education, self-management, and treatment planning with his or her health care team, including the collaborative development of an individualized eating plan (56,71). All providers should refer people with diabetes for individualized MNT provided by a registered dietitian nutritionist (RD/RDN) who is knowledgeable and skilled in providing diabetes-specific MNT (72) at diagnosis and as needed throughout the life span, similar to DSMES. MNT delivered by an RD/RDN is associated with A1C absolute decreases of 1.0–1.9% for people with type 1 diabetes (73) and 0.3–2.0% for people with type 2 diabetes (73). See **Table 5.1** for specific nutrition recommendations. Because of the progressive nature of type 2 diabetes, behavior modification alone may not be adequate to maintain euglycemia over time. However, after medication is initiated, nutrition therapy continues to be an important component, and RD/RDNs providing MNT in diabetes care should assess and monitor medication changes in relation to the nutrition care plan (56,71).

Table 5.1—Medical nutrition therapy recommendations

Topic	Recommendation
Effectiveness of nutrition therapy	**5.9** An individualized medical nutrition therapy program as needed to achieve treatment goals, provided by a registered dietitian nutritionist (RD/RDN), preferably one who has comprehensive knowledge and experience in diabetes care, is recommended for all people with type 1 or type 2 diabetes, prediabetes, and gestational diabetes mellitus. **A** **5.10** Because diabetes medical nutrition therapy can result in cost savings **B** and improved outcomes (e.g., A1C reduction, reduced weight, decrease in cholesterol) **A**, medical nutrition therapy should be adequately reimbursed by insurance and other payers. **E**
Energy balance	**5.11** For all patients with overweight or obesity, behavioral modification to achieve and maintain a minimum weight loss of 5% is recommended. **A**
Eating patterns and macronutrient distribution	**5.12** There is no ideal macronutrient pattern for people with diabetes; meal plans should be individualized while keeping total calorie and metabolic goals in mind. **E** **5.13** A variety of eating patterns can be considered for the management of type 2 diabetes and to prevent diabetes in individuals with prediabetes. **B** **5.14** Reducing overall carbohydrate intake for individuals with diabetes has demonstrated the most evidence for improving glycemia and may be applied in a variety of eating patterns that meet individual needs and preferences. **B**
Carbohydrates	**5.15** Carbohydrate intake should emphasize nutrient-dense carbohydrate sources that are high in fiber (at least 14 g fiber per 1,000 kcal) and minimally processed. Eating plans should emphasize nonstarchy vegetables, fruits, and whole grains, as well as dairy products, with minimal added sugars. **B** **5.16** People with diabetes and those at risk are advised to replace sugar-sweetened beverages (including fruit juices) with water as much as possible in order to control glycemia and weight and reduce their risk for cardiovascular disease and fatty liver **B** and should minimize the consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices. **A** **5.17** When using a flexible insulin therapy program, education on the glycemic impact of carbohydrate **A**, fat, and protein **B** should be tailored to an individual's needs and preferences and used to optimize mealtime insulin dosing. **5.18** When using fixed insulin doses, individuals should be provided education about consistent pattern of carbohydrate intake with respect to time and amount, while considering the insulin action time, as it can result in improved glycemia and reduce the risk for hypoglycemia. **B**
Protein	**5.19** In individuals with type 2 diabetes, ingested protein appears to increase insulin response without increasing plasma glucose concentrations. Therefore, carbohydrate sources high in protein should be avoided when trying to treat or prevent hypoglycemia. **B**
Dietary fat	**5.20** An eating plan emphasizing elements of a Mediterranean-style eating pattern rich in monounsaturated and polyunsaturated fats may be considered to improve glucose metabolism and lower cardiovascular disease risk. **B** **5.21** Eating foods rich in long-chain n-3 fatty acids, such as fatty fish (EPA and DHA) and nuts and seeds (ALA), is recommended to prevent or treat cardiovascular disease. **B**
Micronutrients and herbal supplements	**5.22** There is no clear evidence that dietary supplementation with vitamins, minerals (such as chromium and vitamin D), herbs, or spices (such as cinnamon or aloe vera) can improve outcomes in people with diabetes who do not have underlying deficiencies, and they are not generally recommended for glycemic control. **C**
Alcohol	**5.23** Adults with diabetes who drink alcohol should do so in moderation (no more than one drink per day for adult women and no more than two drinks per day for adult men). **C** **5.24** Educating people with diabetes about the signs, symptoms, and self-management of delayed hypoglycemia after drinking alcohol, especially when using insulin or insulin secretagogues, is recommended. The importance of glucose monitoring after drinking alcoholic beverages to reduce hypoglycemia risk should be emphasized. **B**
Sodium	**5.25** Sodium consumption should be limited to $<$2,300 mg/day. **B**
Nonnutritive sweeteners	**5.26** The use of nonnutritive sweeteners as a replacement for sugar-sweetened products may reduce overall calorie and carbohydrate intake as long as there is not a compensatory increase of energy intake from other sources. Overall, people are encouraged to decrease both sweetened and nonnutritive-sweetened beverages, with an emphasis on water intake. **B**

Goals of Nutrition Therapy for Adults With Diabetes

1. To promote and support healthful eating patterns, emphasizing a variety of nutrient-dense foods in appropriate portion sizes, to improve overall health and:
   - achieve and maintain body weight goals
   - attain individualized glycemic, blood pressure, and lipid goals
   - delay or prevent the complications of diabetes
2. To address individual nutrition needs based on personal and cultural preferences, health literacy and numeracy, access to healthful foods, willingness and ability to make behavioral changes, and existing barriers to change
3. To maintain the pleasure of eating by providing nonjudgmental messages about food choices while limiting food choices only when indicated by scientific evidence
4. To provide an individual with diabetes the practical tools for developing healthy eating patterns rather than focusing on individual macronutrients, micronutrients, or single foods

Weight Management

Management and reduction of weight is important for people with type 1 diabetes, type 2 diabetes, or prediabetes with overweight or obesity. To support weight loss and improve A1C, cardiovascular disease (CVD) risk factors, and well-being in adults with overweight/obesity and prediabetes or diabetes, MNT and DSMES services should include an individualized eating plan in a format that results in an energy deficit in combination with enhanced physical activity (56). Lifestyle intervention programs should be intensive and have frequent follow-up to achieve significant reductions in excess body weight and improve clinical indicators. There is strong and consistent evidence that modest, sustained weight loss can delay the progression from prediabetes to type 2 diabetes (73–75) (see Section 3, "Prevention or Delay of Type 2 Diabetes and Associated Comorbidities," https://doi.org/10.2337/dc22-S003) and is beneficial for the management of type 2 diabetes (see Section 8, "Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes," https://doi.org/10.2337/dc22-S008).

In prediabetes, the weight loss goal is 7–10% for preventing progression to type 2 diabetes (76). In conjunction with support for healthy lifestyle behaviors, medication-assisted weight loss can be considered for people at risk for type 2 diabetes when needed to achieve and sustain 7–10% weight loss (77,78) (see Section 8, "Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes," https://doi.org/10.2337/dc22-S008). People with prediabetes at a healthy weight should also be considered for behavioral interventions to help establish routine aerobic and resistance exercise (76,79,80), as well as to establish healthy eating patterns. Services delivered by practitioners familiar with diabetes and its management, such as an RD/RDN, have been found to be effective (72).

For many individuals with overweight and obesity with type 2 diabetes, 5% weight loss is needed to achieve beneficial outcomes in glycemic control, lipids, and blood pressure (81). It should be noted, however, that the clinical benefits of weight loss are progressive, and more intensive weight loss goals (i.e., 15%) may be appropriate to maximize benefit depending on need, feasibility, and safety (82,83). In select individuals with type 2 diabetes, an overall healthy eating plan that results in energy deficit in conjunction with weight loss medications and/or metabolic surgery should be considered to help achieve weight loss and maintenance goals, lower A1C, and reduce CVD risk (77,84,85). Overweight and obesity are also increasingly prevalent in people with type 1 diabetes and present clinical challenges regarding diabetes treatment and CVD risk factors (86,87). Sustaining weight loss can be challenging (81,88) but has long-term benefits; maintaining weight loss for 5 years is associated with sustained improvements in A1C and lipid levels (89). MNT guidance from an RD/RDN with expertise in diabetes and weight management, throughout the course of a structured weight loss plan, is strongly recommended.

Along with routine medical management visits, people with diabetes and prediabetes should be screened during DSMES and MNT encounters for a history of dieting and past or current disordered eating behaviors. Nutrition therapy should be individualized to help address maladaptive eating behavior (e.g., purging) or compensatory changes in medical regimen (e.g., overtreatment of hypoglycemic episodes, reduction in medication dosing to reduce hunger) (56) (see DISORDERED EATING BEHAVIOR below). Disordered eating and/or eating disorders can increase challenges for weight and diabetes management. For example, caloric restriction may be essential for glycemic control and weight maintenance, but rigid meal plans may be contraindicated for individuals who are at increased risk of clinically significant maladaptive eating behaviors (90). If clinically significant eating disorders are identified during screening with diabetes-specific questionnaires, individuals should be referred to a mental health professional as needed (1).

Studies have demonstrated that a variety of eating plans, varying in macronutrient composition, can be used effectively and safely in the short term (1–2 years) to achieve weight loss in people with diabetes. These plans include structured low-calorie meal plans with meal replacements (82,89,91), a Mediterranean-style eating pattern (92), and low-carbohydrate meal plans with additional support (93,94). However, no single approach has been proven to be consistently superior (56,95–97), and more data are needed to identify and validate those meal plans that are optimal with respect to long-term outcomes and patient acceptability. The importance of providing guidance on an individualized meal plan containing nutrient-dense foods, such as vegetables, fruits, legumes, dairy, lean sources of protein (including plant-based sources as well as lean meats, fish, and poultry), nuts, seeds, and whole grains, cannot be overemphasized (96), as well as guidance on achieving the desired energy deficit (98–101). Any approach to meal planning should be individualized considering the health status, personal preferences, and ability of the person with diabetes to sustain the recommendations in the plan.

Eating Patterns and Meal Planning

Evidence suggests that there is not an ideal percentage of calories from carbohydrate, protein, and fat for people with diabetes. Therefore, macronutrient distribution should be based on an individualized assessment of current eating patterns, preferences, and metabolic goals. Dietary guidance should emphasize the importance of a healthy dietary pattern as a whole rather than focusing on individual nutrients, foods, or food groups, given that individuals rarely eat foods in isolation. Personal preferences (e.g., tradition, culture, religion, health beliefs and goals, economics) as well as metabolic goals need to be considered when working with individuals to determine the best eating pattern for them (56, 73,102). Members of the health care team should complement MNT by providing evidence-based guidance that helps people with diabetes make healthy food choices that meet their individualized needs and improve overall health. A variety of eating patterns are acceptable for the management of diabetes (56,103–105). Until the evidence surrounding comparative benefits of different eating patterns in specific individuals strengthens, health care providers should focus on the key factors that are common among the patterns: *1*) emphasize nonstarchy vegetables, *2*) minimize added sugars and refined grains, and *3*) choose whole foods over highly processed foods to the extent possible (56). An individualized eating pattern also considers the individual's health status, food and numeracy skills, resources, food preferences, and health goals. Referral to an RD/RDN is essential to assess the overall nutrition status of, and to work collaboratively with, the patient to create a personalized meal plan that coordinates and aligns with the overall treatment plan, including physical activity and medication use. The Mediterranean-style (102,106–108), low-carbohydrate (109–111), and vegetarian or plant-based (107,108,112,113) eating patterns are all examples of healthful eating patterns that have shown positive results in research for individuals with type 2 diabetes, but individualized meal planning should focus on personal preferences, needs, and goals. There is currently inadequate research in type 1 diabetes to support one eating pattern over another.

For individuals with type 2 diabetes not meeting glycemic targets or for whom reducing glucose-lowering drugs is a priority, reducing overall carbohydrate intake with a low- or very-low-carbohydrate eating pattern is a viable option (109–111). As research studies on low-carbohydrate eating plans generally indicate challenges with long-term sustainability (114), it is important to reassess and individualize meal plan guidance regularly for those interested in this approach. Most individuals with diabetes report a moderate intake of carbohydrate (44–46% of total calories) (103). Efforts to modify habitual eating patterns are often unsuccessful in the long term; people generally go back to their usual macronutrient distribution (103). Thus, the recommended approach is to individualize meal plans with a macronutrient distribution that is more consistent with personal preference and usual intake to increase the likelihood for long-term maintenance.

An RCT found that two meal planning approaches were effective in helping achieve improved A1C, particularly for individuals with an A1C between 7% and 10% (115). The diabetes plate method is a commonly used visual approach for providing basic meal planning guidance. This simple graphic (featuring a 9-inch plate) shows how to portion foods (1/2 of the plate for nonstarchy vegetables, 1/4 of the plate for protein, and 1/4 of the plate for carbohydrates). Carbohydrate counting is a more advanced skill that helps plan for and track how much carbohydrate is consumed at meals and snacks. Meal planning approaches should be customized to the individual, including their numeracy (115) and food literacy level. Food literacy generally describes proficiency in food-related knowledge and skills that ultimately impact health, although specific definitions vary across initiatives (116,117).

Carbohydrates

Studies examining the ideal amount of carbohydrate intake for people with diabetes are inconclusive, although monitoring carbohydrate intake and considering the blood glucose response to dietary carbohydrate are key for improving postprandial glucose management (118, 119). The literature concerning glycemic index and glycemic load in individuals with diabetes is complex, often with varying definitions of low and high glycemic index foods (120,121). The glycemic index ranks carbohydrate foods on their postprandial glycemic response, and glycemic load takes into account both the glycemic index of foods and the amount of carbohydrate eaten. Studies have found mixed results regarding the effect of glycemic index and glycemic load on fasting glucose levels and A1C, with one systematic review finding no significant impact on A1C (122), while two others demonstrated A1C reductions of 0.15% (120) to 0.5% (123).

Reducing overall carbohydrate intake for individuals with diabetes has demonstrated evidence for improving glycemia and may be applied in a variety of eating patterns that meet individual needs and preferences (56). For people with type 2 diabetes, low-carbohydrate and very-low-carbohydrate eating patterns, in particular, have been found to reduce A1C and the need for antihyperglycemic medications (56,102,114,124–126). Systematic reviews and meta-analyses of RCTs found carbohydrate-restricted eating patterns, particularly those considered low-carbohydrate (<26% total energy), were effective in reducing A1C in the short term (<6 months), with less difference in eating patterns beyond 1 year (97,98,109, 110,125). Part of the challenge in interpreting low-carbohydrate research has been due to the wide range of definitions for a low-carbohydrate eating plan (111,123). Weight reduction was also a goal in many low-carbohydrate studies, which further complicates evaluating the distinct contribution of the eating pattern (41,93,97,127). As research studies on low-carbohydrate eating plans generally indicate challenges with long-term sustainability (114), it is important to reassess and individualize meal plan guidance regularly for those interested in this approach. Providers should maintain consistent medical oversight and recognize that insulin and other diabetes medications may need to be adjusted to prevent hypoglycemia; and blood pressure will need to be monitored. In addition, very-low-carbohydrate eating plans are not currently recommended for women who are pregnant or lactating, children, people who have renal disease, or people with or at risk for disordered eating, and these plans should be used with caution in those taking sodium–glucose cotransporter 2 inhibitors because of the potential risk of ketoacidosis (128,129).

Regardless of amount of carbohydrate in the meal plan, focus should be placed on high-quality, nutrient-dense carbohydrate sources that are high in fiber and minimally processed. Both children and adults with diabetes are encouraged to minimize intake of refined carbohydrates with added sugars, fat, and sodium and instead focus on carbohydrates from vegetables, legumes, fruits, dairy (milk and yogurt), and whole grains. People with diabetes and those at risk for diabetes are encouraged to consume a minimum of 14 g of fiber/1,000 kcal, with at least half of grain consumption being whole, intact grains, according to the Dietary Guidelines for Americans (130). Regular intake of sufficient dietary fiber is associated with lower all-cause mortality in people with diabetes (131,132), and prospective cohort studies have found dietary fiber intake is inversely associated with risk of type 2 diabetes (133–135). The consumption of sugar-sweetened beverages and processed food products with high amounts of refined grains and added sugars is strongly discouraged (130,136–138), as these have the capacity to displace healthier, more nutrient-dense food choices.

Individuals with type 1 or type 2 diabetes taking insulin at mealtime should be offered intensive and ongoing education on the need to couple insulin administration with carbohydrate intake. For people whose meal schedule or carbohydrate consumption is variable, regular education to increase understanding of the relationship between carbohydrate intake and insulin needs is important. In addition, education on using insulin-to-carbohydrate ratios for meal planning can assist individuals with effectively modifying insulin dosing from meal to meal to improve glycemic management (103,118,139–142). When consuming a mixed meal that contains carbohydrate and is high in fat and/or protein, insulin dosing should not be based solely on carbohydrate counting (56). Studies have shown that dietary fat and protein can impact early and delayed postprandial glycemia (143–146), and it appears to have a dose-dependent response (147–149). Results from high-fat, high-protein meal studies highlight the need for additional insulin to cover these meals; however, more studies are needed to determine the optimal insulin dose and delivery strategy. The results from these studies also point to individual differences in postprandial glycemic response; therefore, a cautious approach to increasing insulin doses for high-fat and/or high-protein mixed meals is recommended to address delayed hyperglycemia that may occur 3 h or more after eating (56). If using an insulin pump, a split bolus feature (part of the bolus delivered immediately, the remainder over a programmed duration of time) may provide better insulin coverage for high-fat and/or high-protein mixed meals (144,150).

The effectiveness of insulin dosing decisions should be confirmed with a structured approach to blood glucose monitoring or continuous glucose monitoring to evaluate individual responses and guide insulin dose adjustments. Checking glucose 3 h after eating may help to determine if additional insulin adjustments are required (i.e., increasing or stopping bolus) (144,150,151). Refining insulin doses to account for high-fat and/or -protein meals requires determination of anticipated nutrient intake to calculate the mealtime dose. Food literacy, numeracy, interest, and capability should be evaluated (56). For individuals on a fixed daily insulin schedule, meal planning should emphasize a relatively fixed carbohydrate consumption pattern with respect to both time and amount, while considering insulin action. Attention to resultant hunger and satiety cues will also help with nutrient modifications throughout the day (56,152).

Protein

There is no evidence that adjusting the daily level of protein intake (typically 1–1.5 g/kg body wt/day or 15–20% total calories) will improve health, and research is inconclusive regarding the ideal amount of dietary protein to optimize either glycemic management or CVD risk (121,153). Therefore, protein intake goals should be individualized based on current eating patterns. Some research has found successful management of type 2 diabetes with meal plans including slightly higher levels of protein (20–30%), which may contribute to increased satiety (154).

Historically, low-protein eating plans were advised for individuals with diabetic kidney disease (DKD) (with albuminuria and/or reduced estimated glomerular filtration rate); however, new evidence does not suggest that people with DKD need to restrict protein to less than the generally recommended protein intake (56). Reducing the amount of dietary protein below the recommended daily allowance of 0.8 g/kg is not recommended because it does not alter glycemic measures, cardiovascular risk measures, or the rate at which glomerular filtration rate declines and may increase risk for malnutrition (155,156).

In individuals with type 2 diabetes, protein intake may enhance or increase the insulin response to dietary carbohydrates (157). Therefore, use of carbohydrate sources high in protein (such as milk and nuts) to treat or prevent hypoglycemia should be avoided due to the potential concurrent rise in endogenous insulin. Providers should counsel patients to treat hypoglycemia with pure glucose (i.e., glucose tablets) or carbohydrate-containing foods at the hypoglycemia alert value of <70 mg/dL. See Section 6, “Glycemic Targets” (https://doi.org/10.2337/dc22-S006), for more information.

Fats

The ideal amount of dietary fat for individuals with diabetes is controversial. New evidence suggests that there is not an ideal percentage of calories from fat for people with or at risk for diabetes and that macronutrient distribution should be individualized according to the patient’s eating patterns, preferences, and metabolic goals (56). The type of fats consumed is more important than total amount of fat when looking at metabolic goals and CVD risk, and it is recommended that the percentage of total calories from saturated fats should be limited (92,130,158–160). Multiple RCTs including patients with type 2 diabetes have reported that a Mediterranean-style eating pattern (92,161–166), rich in polyunsaturated and monounsaturated fats, can improve both glycemic management and blood lipids.

Evidence does not conclusively support recommending n-3 (eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]) supplements for all people with diabetes for the prevention or treatment of cardiovascular events (56,167,168). In individuals with type 2 diabetes, two systematic reviews with n-3 and n-6 fatty acids concluded that the dietary supplements did not improve glycemic management (121,169). In the ASCEND trial (A Study of Cardiovascular Events iN Diabetes), when compared with placebo, supplementation with n-3 fatty acids at the dose of 1 g/day did not lead to cardiovascular benefit in people with diabetes without evidence of CVD (170). However, results from the Reduction of Cardiovascular Events With Icosapent Ethyl–Intervention Trial (REDUCE-IT) did find that supplementation with 4 g/day of pure EPA significantly lowered the risk of adverse cardiovascular events. This trial of 8,179 participants, in which over 50% had diabetes, found a 5% absolute reduction in cardiovascular events for individuals with established atherosclerotic CVD taking a preexisting statin with residual hypertriglyceridemia (135–499 mg/dL) (171). See Section 10, "Cardiovascular Disease and Risk Management" (https://doi.org/10.2337/dc22-S010), for more information. People with diabetes should be advised to follow the guidelines for the general population for the recommended intakes of saturated fat, dietary cholesterol, and *trans* fat (130). *Trans* fats should be avoided. In addition, as saturated fats are progressively decreased in the diet, they should be replaced with unsaturated fats and not with refined carbohydrates (165).

Sodium

As for the general population, people with diabetes are advised to limit their sodium consumption to $<$2,300 mg/day (56). Restriction to $<$1,500 mg, even for those with hypertension, is generally not recommended (172–174). Sodium recommendations should take into account palatability, availability, affordability, and the difficulty of achieving low-sodium recommendations in a nutritionally adequate diet (175).

Micronutrients and Supplements

There continues to be no clear evidence of benefit from herbal or nonherbal (i.e., vitamin or mineral) supplementation for people with diabetes without underlying deficiencies (56). Metformin is associated with vitamin B12 deficiency per a report from the Diabetes Prevention Program Outcomes Study (DPPOS), suggesting that periodic testing of vitamin B12 levels should be considered in patients taking metformin, particularly in those with anemia or peripheral neuropathy (176). Routine supplementation with antioxidants, such as vitamins E and C and carotene, is not advised due to lack of evidence of efficacy and concern related to long-term safety. In addition, there is insufficient evidence to support the routine use of herbal supplements and micronutrients, such as cinnamon (177), curcumin, vitamin D (178), aloe vera, or chromium, to improve glycemia in people with diabetes (56,179).

Although the Vitamin D and Type 2 Diabetes (D2d) prospective RCT showed no significant benefit of vitamin D versus placebo on the progression to type 2 diabetes in individuals at high risk (180), post hoc analyses and meta-analyses suggest a potential benefit in specific populations (180–183). Further research is needed to define patient characteristics and clinical indicators where vitamin D supplementation may be of benefit.

For special populations, including pregnant or lactating women, older adults, vegetarians, and people following very-low-calorie or low-carbohydrate diets, a multivitamin may be necessary.

Alcohol

Moderate alcohol intake does not have major detrimental effects on long-term blood glucose management in people with diabetes. Risks associated with alcohol consumption include hypoglycemia and/or delayed hypoglycemia (particularly for those using insulin or insulin secretagogue therapies), weight gain, and hyperglycemia (for those consuming excessive amounts) (56,179). People with diabetes should be educated about these risks and encouraged to monitor blood glucose frequently after drinking alcohol to minimize such risks. People with diabetes can follow the same guidelines as those without diabetes if they choose to drink. For women, no more than one drink per day, and for men, no more than two drinks per day is recommended (one drink is equal to a 12-oz beer, a 5-oz glass of wine, or 1.5 oz of distilled spirits).

Nonnutritive Sweeteners

The U.S. Food and Drug Administration has approved many nonnutritive sweeteners for consumption by the general public, including people with diabetes (56,184). For some people with diabetes who are accustomed to regularly consuming sugar-sweetened products, nonnutritive sweeteners (containing few or no calories) may be an acceptable substitute for nutritive sweeteners (those containing calories, such as sugar, honey, and agave syrup) when consumed in moderation (185,186). Nonnutritive sweeteners do not appear to have a significant effect on glycemic management (103,187,188), but they can reduce overall calorie and carbohydrate intake (103,185) as long as individuals are not compensating with additional calories from other food sources (56,189). There is mixed evidence from systematic reviews and meta-analyses for nonnutritive sweetener use with regard to weight management, with some finding benefit in weight loss (190–192), while other research suggests an association with weight gain (193). The addition of nonnutritive sweeteners to diets poses no benefit for weight loss or reduced weight gain without energy restriction (194). Low-calorie or nonnutritive-sweetened beverages may serve as a short-term replacement strategy; however, people with diabetes should be encouraged to decrease both sweetened and nonnutritive-sweetened beverages, with an emphasis on water intake (186). Additionally, some research has found that higher nonnutritive-sweetened beverage and sugar-sweetened beverage consumption may be associated with the development of type 2 diabetes, although substantial heterogeneity makes interpreting the results difficult (195–198).

PHYSICAL ACTIVITY

Recommendations

5.27 Children and adolescents with type 1 or type 2 diabetes or prediabetes should engage in 60 min/day or more of moderate- or vigorous-intensity aerobic activity, with vigorous muscle-strengthening and bone-strengthening activities at least 3 days/week. **C**

5.28 Most adults with type 1 **C** and type 2 **B** diabetes should engage in 150 min or more of moderate- to vigorous-intensity aerobic activity per week, spread over at least 3 days/week, with no more than 2 consecutive days without activity. Shorter durations (minimum 75 min/week) of vigorous-intensity or interval training may be sufficient for younger and more physically fit individuals.

5.29 Adults with type 1 **C** and type 2 **B** diabetes should engage in 2–3 sessions/week of resistance exercise on nonconsecutive days.

5.30 All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behavior. **B** Prolonged sitting should be interrupted every 30 min for blood glucose benefits. **C**

5.31 Flexibility training and balance training are recommended 2–3 times/week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance. **C**

5.32 Evaluate baseline physical activity and sedentary time. Promote increase in nonsedentary activities above baseline for sedentary individuals with type 1 **E** and type 2 **B** diabetes. Examples include walking, yoga, housework, gardening, swimming, and dancing.

Physical activity is a general term that includes all movement that increases energy use and is an important part of the diabetes management plan. Exercise is a more specific form of physical activity that is structured and designed to improve physical fitness. Both physical activity and exercise are important. Exercise has been shown to improve blood glucose control, reduce cardiovascular risk factors, contribute to weight loss, and improve well-being (199). Physical activity is as important for those with type 1 diabetes as it is for the general population, but its specific role in the prevention of diabetes complications and the management of blood glucose is not as clear as it is for those with type 2 diabetes. A recent study suggested that the percentage of people with diabetes who achieved the recommended exercise level per week (150 min) varied by race. Objective measurement by accelerometer showed that 44.2%, 42.6%, and 65.1% of Whites, African Americans, and Hispanics, respectively, met the threshold (200). It is important for diabetes care management teams to understand the difficulty that many patients have reaching recommended treatment targets and to identify individualized approaches to improve goal achievement.

Moderate to high volumes of aerobic activity are associated with substantially lower cardiovascular and overall mortality risks in both type 1 and type 2 diabetes (201). A recent prospective observational study of adults with type 1 diabetes suggested that higher amounts of physical activity led to reduced cardiovascular mortality after a mean follow-up time of 11.4 years for patients with and without chronic kidney disease (202). Additionally, structured exercise interventions of at least 8 weeks' duration have been shown to lower A1C by an average of 0.66% in people with type 2 diabetes, even without a significant change in BMI (203). There are also considerable data for the health benefits (e.g., increased cardiovascular fitness, greater muscle strength, improved insulin sensitivity, etc.) of regular exercise for those with type 1 diabetes (204). A recent study suggested that exercise training in type 1 diabetes may also improve several important markers such as triglyceride level, LDL, waist circumference, and body mass (205). In adults with type 2 diabetes, higher levels of exercise intensity are associated with greater improvements in A1C and in cardiorespiratory fitness (206); sustained improvements in cardiorespiratory fitness and weight loss have also been associated with a lower risk of heart failure (207). Other benefits include slowing the decline in mobility among overweight patients with diabetes (208). The ADA position statement "Physical Activity/Exercise and Diabetes" reviews the evidence for the benefits of exercise in people with type 1 and type 2 diabetes and offers specific recommendations (209). Increased physical activity (soccer training) has also been shown to be beneficial for improving overall fitness in Latino men with obesity, demonstrating feasible methods to increase physical activity in an often hard-to-engage population (210). Physical activity and exercise should be recommended and prescribed to all individuals who are at risk for or with diabetes as part of management of glycemia and overall health. Specific recommendations and precautions will vary by the type of diabetes, age, activity done, and presence of diabetes-related health complications. Recommendations should be tailored to meet the specific needs of each individual (209).

Exercise and Children

All children, including children with diabetes or prediabetes, should be encouraged to engage in regular physical activity. Children should engage in at least 60 min of moderate to vigorous aerobic activity every day, with muscle- and bone-strengthening activities at least 3 days per week (211). In general, youth with type 1 diabetes benefit from being physically active, and an active lifestyle should be recommended to all (212). Youth with type 1 diabetes who engage in more physical activity may have better health outcomes and health-related quality of life (213,214).

Frequency and Type of Physical Activity

People with diabetes should perform aerobic and resistance exercise regularly (209). Aerobic activity bouts should ideally last at least 10 min, with the goal of ~30 min/day or more most days of the week for adults with type 2 diabetes. Daily exercise, or at least not allowing more than 2 days to elapse between exercise sessions, is recommended to decrease insulin resistance, regardless of diabetes type (215,216). A study in adults with type 1 diabetes found a dose-response inverse relationship between self-reported bouts of physical activity per week and A1C, BMI, hypertension, dyslipidemia, and diabetes-related complications such as hypoglycemia, diabetic ketoacidosis, retinopathy, and microalbuminuria (217). Over time, activities should progress in intensity, frequency, and/or duration to at least 150 min/week of moderate-intensity exercise. Adults able to run at 6 miles/h (9.7 km/h) for at least 25 min can benefit sufficiently from shorter-intensity activity (75 min/week) (209). Many adults, including most with type 2 diabetes, may be unable or unwilling to participate in such intense exercise and should engage in moderate exercise for the recommended duration. Adults with diabetes should engage in 2–3 sessions/week of resistance exercise on nonconsecutive days (218). Although heavier resistance training with free weights and weight machines may improve glycemic control and strength (219), resistance training of any intensity is recommended to improve strength, balance, and the ability to engage in activities of daily living throughout the life span. Providers and staff should help patients set stepwise goals toward meeting the recommended exercise targets. As individuals intensify their exercise program, medical monitoring may be indicated to ensure safety and evaluate the effects on glucose management. (See the section PHYSICAL ACTIVITY AND GLYCEMIC CONTROL below.)

Recent evidence supports that all individuals, including those with diabetes, should be encouraged to reduce the amount of time spent being sedentary—waking behaviors with low energy expenditure (e.g., working at a computer, watching television)—by breaking up bouts of sedentary activity (>30 min) by briefly standing, walking, or performing other light physical activities (220,221). Participating in leisure-time activity and avoiding extended sedentary periods may help prevent type 2 diabetes for those at risk (222,223) and may also aid in glycemic control for those with diabetes.

A systematic review and meta-analysis found higher frequency of regular leisure-time physical activity was more effective in reducing A1C levels (224). A wide range of activities, including yoga, tai chi, and other types, can have significant impacts on A1C, flexibility, muscle strength, and balance (199,225–227). Flexibility and balance exercises may be particularly important in older adults with diabetes to maintain range of motion, strength, and balance (209).

Physical Activity and Glycemic Control

Clinical trials have provided strong evidence for the A1C-lowering value of resistance training in older adults with type 2 diabetes (228) and for an additive benefit of combined aerobic and resistance exercise in adults with type 2 diabetes (229). If not contraindicated, patients with type 2 diabetes should be encouraged to do at least two weekly sessions of resistance exercise (exercise with free weights or weight machines), with each session consisting of at least one set (group of consecutive repetitive exercise motions) of five or more different resistance exercises involving the large muscle groups (228).

For type 1 diabetes, although exercise in general is associated with improvement in disease status, care needs to be taken in titrating exercise with respect to glycemic management. Each individual with type 1 diabetes has a variable glycemic response to exercise. This variability should be taken into consideration when recommending the type and duration of exercise for a given individual (204).

Women with preexisting diabetes, particularly type 2 diabetes, and those at risk for or presenting with gestational diabetes mellitus should be advised to engage in regular moderate physical activity prior to and during their pregnancies as tolerated (209).

Pre-exercise Evaluation

As discussed more fully in Section 10, “Cardiovascular Disease and Risk Management” (https://doi.org/10.2337/dc22-S010), the best protocol for assessing asymptomatic patients with diabetes for coronary artery disease remains unclear. The ADA consensus report “Screening for Coronary Artery Disease in Patients With Diabetes” (230) concluded that routine testing is not recommended. However, providers should perform a careful history, assess cardiovascular risk factors, and be aware of the atypical presentation of coronary artery disease, such as recent patient-reported or tested decrease in exercise tolerance, in patients with diabetes. Certainly, high-risk patients should be encouraged to start with short periods of low-intensity exercise and slowly increase the intensity and duration as tolerated. Providers should assess patients for conditions that might contraindicate certain types of exercise or predispose to injury, such as uncontrolled hypertension, untreated proliferative retinopathy, autonomic neuropathy, peripheral neuropathy, and a history of foot ulcers or Charcot foot. The patient’s age and previous physical activity level should be considered when customizing the exercise regimen to the individual’s needs. Those with complications may need a more thorough evaluation prior to starting an exercise program (204,231).

Hypoglycemia

In individuals taking insulin and/or insulin secretagogues, physical activity may cause hypoglycemia if the medication dose or carbohydrate consumption is not adjusted for the exercise bout and post-bout impact on glucose. Individuals on these therapies may need to ingest some added carbohydrate if pre-exercise glucose levels are <90 mg/dL (5.0 mmol/L), depending on whether they are able to lower insulin doses during the workout (such as with an insulin pump or reduced pre-exercise insulin dosage), the time of day exercise is done, and the intensity and duration of the activity (204,231). In some patients, hypoglycemia after exercise may occur and last for several hours due to increased insulin sensitivity. Hypoglycemia is less common in patients with diabetes who are not treated with insulin or insulin secretagogues, and no routine preventive measures for hypoglycemia are usually advised in these cases. Intense activities may actually raise blood glucose levels instead of lowering them, especially if pre-exercise glucose levels are elevated (204). Because of the variation in glycemic response to exercise bouts, patients need to be educated to check blood glucose levels before and after periods of exercise and about the potential prolonged effects (depending on intensity and duration) (see the section DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT above).

Exercise in the Presence of Microvascular Complications

See Section 11, "Chronic Kidney Disease and Risk Management" (https://doi.org/10.2337/dc22-S011), and Section 12, “Retinopathy, Neuropathy, and Foot Care” (https://doi.org/10.2337/dc22-S012), for more information on these long-term complications.

Retinopathy

If proliferative diabetic retinopathy or severe nonproliferative diabetic retinopathy is present, then vigorous-intensity aerobic or resistance exercise may be contraindicated because of the risk of triggering vitreous hemorrhage or retinal detachment (232). Consultation with an ophthalmologist prior to engaging in an intense exercise regimen may be appropriate.

Peripheral Neuropathy

Decreased pain sensation and a higher pain threshold in the extremities can result in an increased risk of skin breakdown, infection, and Charcot joint destruction with some forms of exercise. Therefore, a thorough assessment should be done to ensure that neuropathy does not alter kinesthetic or proprioceptive sensation during physical activity, particularly in those with more severe neuropathy. Studies have shown that moderate-intensity walking may not lead to an increased risk of foot ulcers or reulceration in those with peripheral neuropathy who use proper footwear (233). In addition, 150 min/week of moderate exercise was reported to improve outcomes in patients with prediabetic neuropathy (234). All individuals with peripheral neuropathy should wear proper footwear and examine their feet daily to detect lesions early. Anyone with a foot injury or open sore should be restricted to non–weight-bearing activities.

Autonomic Neuropathy

Autonomic neuropathy can increase the risk of exercise-induced injury or adverse events through decreased cardiac responsiveness to exercise, postural hypotension, impaired thermoregulation, impaired night vision due to impaired papillary reaction, and greater susceptibility to hypoglycemia (235). Cardiovascular autonomic neuropathy is also an independent risk factor for cardiovascular death and silent myocardial ischemia (236). Therefore, individuals with diabetic autonomic neuropathy should undergo cardiac investigation before beginning physical activity more intense than that to which they are accustomed.

Diabetic Kidney Disease

Physical activity can acutely increase urinary albumin excretion. However, there is no evidence that vigorous-intensity exercise accelerates the rate of progression of DKD, and there appears to be no need for specific exercise restrictions for people with DKD in general (232).

SMOKING CESSATION: TOBACCO AND E-CIGARETTES

Recommendations

5.33 Advise all patients not to use cigarettes and other tobacco products or e-cigarettes. **A**

5.34 After identification of tobacco or e-cigarette use, include smoking cessation counseling and other forms of treatment as a routine component of diabetes care. **A**

5.35 Address smoking cessation as part of diabetes education programs for those in need. **B**

Results from epidemiologic, case-control, and cohort studies provide convincing evidence to support the causal link between cigarette smoking and health risks (237). Recent data show tobacco use is higher among adults with chronic conditions (238) as well as in adolescents and young adults with diabetes (239). People with diabetes who smoke (and people with diabetes exposed to second-hand smoke) have a heightened risk of CVD, premature death, microvascular complications, and worse glycemic control when compared with those who do not smoke (240–242). Smoking may have a role in the development of type 2 diabetes (243–245).

The routine and thorough assessment of tobacco use is essential to prevent smoking or encourage cessation. Numerous large randomized clinical trials have demonstrated the efficacy and cost-effectiveness of brief counseling in smoking cessation, including the use of telephone quit lines, in reducing tobacco use. Pharmacologic therapy to assist with smoking cessation in people with diabetes has been shown to be effective (246), and for the patient motivated to quit, the addition of pharmacologic therapy to counseling is more effective than either treatment alone (247). Special considerations should include assessment of level of nicotine dependence, which is associated with difficulty in quitting and relapse (248). Although some people may gain weight in the period shortly after smoking cessation (249), recent research has demonstrated that this weight gain does not diminish the substantial CVD benefit realized from smoking cessation (250). One study in people who smoke who had newly diagnosed type 2 diabetes found that smoking cessation was associated with amelioration of metabolic parameters and reduced blood pressure and albuminuria at 1 year (251).

In recent years, e-cigarettes have gained public awareness and popularity because of perceptions that e-cigarette use is less harmful than regular cigarette smoking (252,253). However, in light of recent Centers for Disease Control and Prevention evidence (254) of deaths related to e-cigarette use, no individuals should be advised to use e-cigarettes, either as a way to stop smoking tobacco or as a recreational drug.

Diabetes education programs offer potential to systematically reach and engage individuals with diabetes in smoking cessation efforts. A cluster randomized trial found statistically significant increases in quit rates and long-term abstinence rates (>6 months) when smoking cessation interventions were offered through diabetes education clinics, regardless of motivation to quit at baseline (255).

PSYCHOSOCIAL ISSUES

Recommendations

5.36 Psychosocial care should be integrated with a collaborative, patient-centered approach and provided to all people with diabetes, with the goals of optimizing health outcomes and health-related quality of life. **A**

5.37 Psychosocial screening and follow-up may include, but are not limited to, attitudes about diabetes, expectations for medical management and outcomes, affect or mood, general and diabetes-related quality of life, available resources (financial, social, and emotional), and psychiatric history. **E**

5.38 Providers should consider assessment for symptoms of diabetes distress, depression, anxiety, disordered eating, and cognitive capacities using age-appropriate standardized and validated tools at the initial visit, at periodic intervals, and when there is a change in disease, treatment, or life circumstance. Including caregivers and family members in this assessment is recommended. **B**

5.39 Consider screening older adults (aged ≥65 years) with diabetes for cognitive impairment and depression. **B** Monitoring of cognitive capacity, i.e., the ability to actively engage in decision-making regarding regimen behaviors, is advised. **B**

Please refer to the ADA position statement "Psychosocial Care for People With Diabetes" for a list of assessment tools and additional details (1).

Complex environmental, social, behavioral, and emotional factors, known as psychosocial factors, influence living with diabetes, both type 1 and type 2, and achieving satisfactory medical outcomes and psychological well-being. Thus, individuals with diabetes and their families are challenged with complex, multifaceted issues when integrating diabetes care into daily life (142).

Emotional well-being is an important part of diabetes care and self-management. Psychological and social problems can impair the individual's (13,256–260) or family's (259) ability to carry out diabetes care tasks and therefore potentially compromise health status. There are opportunities for the clinician to routinely assess psychosocial status in a timely and efficient manner for referral to appropriate services (261,262). A systematic review and meta-analysis showed that psychosocial interventions modestly but significantly improved A1C (standardized mean difference –0.29%) and mental health outcomes (263). There was a limited association between the effects on A1C and mental health, and no intervention characteristics predicted benefit on both outcomes. However, cost analyses have shown that behavioral health interventions are both effective and cost-efficient approaches to the prevention of diabetes (264).

Screening

Key opportunities for psychosocial screening occur at diabetes diagnosis, during regularly scheduled management visits, during hospitalizations, with new onset of complications, during significant transitions in care such as from pediatric to adult care teams (265), or when problems with achieving A1C goals, quality of life, or self-management are identified (2). Patients are likely to exhibit psychological vulnerability at diagnosis, when their medical status changes (e.g., end of the honeymoon period), when the need for intensified treatment is evident, and when complications are discovered. Significant changes in life circumstances, often called social determinants of health, are known to considerably affect a person's ability to self-manage their condition. Thus, screening for social determinants of health (e.g., loss of employment, birth of a child, or other family-based stresses) should also be incorporated into routine care (266).

Providers can start with informal verbal inquires, for example, by asking whether there have been persistent changes in mood during the past 2 weeks or since the patient's last visit and whether the person can identify a triggering event or change in circumstances. Providers should also ask whether there are new or different barriers to treatment and self-management, such as feeling overwhelmed or stressed by having diabetes (see the section DIABETES DISTRESS below), changes in finances, or competing medical demands (e.g., the diagnosis of a comorbid condition). In circumstances where individuals other than the patient are significantly involved in diabetes management, these issues should be explored with nonmedical care providers (265). Standardized and validated tools for psychosocial monitoring and assessment can also be used by providers (1), with positive findings leading to referral to a mental health provider specializing in diabetes for comprehensive evaluation, diagnosis, and treatment.

Diabetes Distress

Recommendation

5.40 Routinely monitor people with diabetes for diabetes distress, particularly when treatment targets are not met and/or at the onset of diabetes complications. **B**

Diabetes distress is very common and is distinct from other psychological disorders (259,267,268). Diabetes distress refers to significant negative psychological reactions related to emotional burdens and worries specific to an individual's experience in having to manage a severe, complicated, and demanding chronic disease such as diabetes (267–269). The constant behavioral demands of diabetes self-management (medication dosing, frequency, and titration; monitoring of blood glucose, food intake, eating patterns, and physical activity) and the potential or actuality of disease progression are directly associated with reports of diabetes distress (267). The prevalence of diabetes distress is reported to be 18–45% with an incidence of 38–48% over 18 months in people with type 2 diabetes (269). In the second Diabetes Attitudes, Wishes and Needs (DAWN2) study, significant diabetes distress was reported by 45% of the participants, but only 24% reported that their health care teams asked them how diabetes affected their lives (259). High levels of diabetes distress significantly impact medication-taking behaviors and are linked to higher A1C, lower self-efficacy, and poorer dietary and exercise behaviors (5,267,269). DSMES has been shown to reduce diabetes distress (5). It may be helpful to provide counseling regarding expected diabetes-related versus generalized psychological distress, both at diagnosis and when disease state or treatment changes occur (270).

An RCT tested the effects of participation in a standardized 8-week mindful self-compassion program versus a control group among patients with type 1 and type 2 diabetes. Mindful self-compassion training increased self-compassion, reduced depression and diabetes distress, and improved A1C in the intervention group (271). An RCT of cognitive behavioral and social problem-solving approaches compared with diabetes education (272) in teens (aged 14–18 years) showed that diabetes distress and depressive symptoms were significantly reduced for up to 3 years postintervention. Neither glycemic control nor self-management behaviors were improved over time. These recent studies support that a combination of approaches is needed to address distress, depression, and metabolic status.

Diabetes distress should be routinely monitored (273) using person-based diabetes-specific validated measures (1). If diabetes distress is identified, the person should be referred for specific diabetes education to address areas of diabetes self-care causing the patient distress and impacting clinical management. Diabetes distress is associated with anxiety, depression, and reduced health-related quality of life (274). People whose self-care remains impaired after tailored diabetes education should be referred by their care team to a behavioral health provider for evaluation and treatment.

Other psychosocial issues known to affect self-management and health outcomes include attitudes about the illness, expectations for medical management and outcomes, available resources (financial, social, and emotional) (275), and psychiatric history.

Referral to a Mental Health Specialist

Indications for referral to a mental health specialist familiar with diabetes management may include positive screening for overall stress related to work-life balance, diabetes distress, diabetes management difficulties, depression, anxiety, disordered eating, and cognitive dysfunction (see **Table 5.2** for a complete list). It is preferable to incorporate psychosocial assessment and treatment into routine care rather than waiting for a specific problem or deterioration in metabolic or psychological status to occur (34,259). Providers should identify behavioral and mental health providers, ideally those who are knowledgeable about diabetes treatment and the psychosocial aspects of diabetes, to whom they can refer patients. The ADA provides a list of mental health providers who have received additional education in diabetes at the ADA Mental Health Provider Directory (professional.diabetes.org/mhp_listing). Ideally, psychosocial care providers should be embedded in diabetes care settings. Although the provider may not feel qualified to treat psychological problems (276), optimizing the patient--provider relationship as a foundation may increase the likelihood of the patient accepting referral for other services. Collaborative care interventions and a team approach have demonstrated efficacy in diabetes self-management, outcomes of depression, and psychosocial functioning (5,6).

Psychosocial/Emotional Distress

Clinically significant psychopathologic diagnoses are considerably more prevalent in people with diabetes than in those without (277,278). Symptoms, both clinical and subclinical, that interfere with the person's ability to carry out daily diabetes self-management tasks must be addressed. In addition to impacting a person's ability to carry out self-management, and the association of mental health diagnosis with poorer short-term glycemic stability, symptoms of emotional distress are associated with mortality risk (277,279). Providers should consider an assessment of symptoms of depression, anxiety, disordered eating, and cognitive capacities using appropriate standardized/validated tools at the initial visit, at periodic intervals when patient distress is suspected, and when there is a change in health, treatment, or life circumstance. Inclusion of caregivers and family members in this assessment is recommended. Diabetes distress is addressed as an independent condition (see the section DIABETES DISTRESS above), as this state is very common and expected and is distinct from the psychological disorders discussed below (1). A list of age-appropriate screening and evaluation measures is provided in the ADA position statement "Psychosocial Care for People with Diabetes" (1).

Anxiety Disorders

Recommendations

5.41 Consider screening for anxiety in people exhibiting anxiety or worries regarding diabetes complications, insulin administration, and taking of medications, as well as fear of hypoglycemia and/or hypoglycemia unawareness that interferes with self-management behaviors, and in those who express fear, dread, or irrational thoughts and/or show anxiety symptoms such as avoidance behaviors, excessive repetitive behaviors, or social withdrawal. Refer for treatment if anxiety is present. **B**

5.42 People with hypoglycemia unawareness, which can co-occur with fear of hypoglycemia, should be treated using blood glucose awareness training (or other evidence-based intervention) to help re-establish awareness of symptoms of hypoglycemia and reduce fear of hypoglycemia. **A**

Anxiety symptoms and diagnosable disorders (e.g., generalized anxiety disorder, body dysmorphic disorder, obsessive-compulsive disorder, specific phobias, and posttraumatic stress disorder) are common in people with diabetes (280). The Behavioral Risk Factor Surveillance System (BRFSS) estimated the lifetime prevalence of generalized anxiety disorder to be 19.5% in people with either type 1 or type 2 diabetes (281). Common diabetes-specific concerns include fears related to hypoglycemia (282,283), not meeting blood glucose targets (280), and insulin injections or infusion (284). Onset of complications presents another critical point in the disease course when anxiety can occur (1). People with diabetes who exhibit excessive diabetes self-management behaviors well beyond what is prescribed or needed to achieve glycemic targets may be experiencing symptoms of obsessive-compulsive disorder (285).

General anxiety is a predictor of injection-related anxiety and associated with fear of hypoglycemia (283,286). Fear of hypoglycemia and hypoglycemia unawareness often co-occur. Interventions aimed at treating one often benefit both (287). Fear of hypoglycemia may explain avoidance of behaviors associated with lowering glucose such as increasing insulin doses or frequency of monitoring. If fear of hypoglycemia is identified and a person does not have symptoms of hypoglycemia, a structured program of blood glucose awareness training delivered in routine clinical practice can improve A1C, reduce the rate of severe hypoglycemia, and restore hypoglycemia awareness (288,289). If not available within the practice setting, a structured program targeting both fear of hypoglycemia and unawareness should be sought out and implemented by a qualified behavioral practitioner (287,289–291).

Depression

Recommendations

5.43 Providers should consider annual screening of all patients with diabetes, especially those with a self-reported history of depression, for depressive symptoms with age-appropriate depression screening measures, recognizing that further evaluation will be necessary for individuals who have a positive screen. **B**

5.44 Beginning at diagnosis of complications or when there are

Table 5.2—Situations that warrant referral of a person with diabetes to a mental health provider for evaluation and treatment

• Self-care remains impaired in a person with diabetes distress after tailored diabetes education
• A positive screen on a validated screening tool for depressive symptoms
• The presence of symptoms or suspicions of disordered eating behavior, an eating disorder, or disrupted patterns of eating
• Intentional omission of insulin or oral medication to cause weight loss is identified
• A positive screen for anxiety or fear of hypoglycemia
• A serious mental illness is suspected
• In youth and families with behavioral self-care difficulties, repeated hospitalizations for diabetic ketoacidosis, or significant distress
• A positive screening for cognitive impairment
• Declining or impaired ability to perform diabetes self-care behaviors
• Before undergoing bariatric or metabolic surgery and after surgery, if assessment reveals an ongoing need for adjustment support

significant changes in medical status, consider assessment for depression. **B**

5.45 Referrals for treatment of depression should be made to mental health providers with experience using cognitive behavioral therapy, interpersonal therapy, or other evidence-based treatment approaches in conjunction with collaborative care with the patient's diabetes treatment team. **A**

History of depression, current depression, and antidepressant medication use are risk factors for the development of type 2 diabetes, especially if the individual has other risk factors such as obesity and family history of type 2 diabetes (292–294). Elevated depressive symptoms and depressive disorders affect one in four patients with type 1 or type 2 diabetes (258). Thus, routine screening for depressive symptoms is indicated in this high-risk population, including people with type 1 or type 2 diabetes, gestational diabetes mellitus, and postpartum diabetes. Regardless of diabetes type, women have significantly higher rates of depression than men (295).

Routine monitoring with age-appropriate validated measures (1) can help to identify if referral is warranted (296). Adult patients with a history of depressive symptoms need ongoing monitoring of depression recurrence within the context of routine care (292). Integrating mental and physical health care can improve outcomes. When a patient is in psychological therapy (talk or cognitive behavioral therapy), the mental health provider should be incorporated into the diabetes treatment team (297). As with DSMES, person-centered collaborative care approaches have been shown to improve both depression and medical outcomes (297). Depressive symptoms may also be a manifestation of reduced quality of life secondary to disease burden (also see *Diabetes Distress*) and resultant changes in resource allocation impacting the person and their family. When depressive symptoms are identified, it is important to query origins both diabetes-specific and due to other life circumstances (274,298).

Various RCTs have shown improvements in diabetes and related health outcomes when depression is simultaneously treated (297,299,300). It is important to note that medical regimen should also be monitored in response to reduction in depressive symptoms. People may agree to or adopt previously refused treatment strategies (improving ability to follow recommended treatment behaviors), which may include increased physical activity and intensification of regimen behaviors and monitoring, resulting in changed glucose profiles.

Disordered Eating Behavior

Recommendations

5.46 Providers should consider reevaluating the treatment regimen of people with diabetes who present with symptoms of disordered eating behavior, an eating disorder, or disrupted patterns of eating. **B**

5.47 Consider screening for disordered or disrupted eating using validated screening measures when hyperglycemia and weight loss are unexplained based on self-reported behaviors related to medication dosing, meal plan, and physical activity. In addition, a review of the medical regimen is recommended to identify potential treatment-related effects on hunger/caloric intake. **B**

Estimated prevalence of disordered eating behavior and diagnosable eating disorders in people with diabetes varies (301–303). For people with type 1 diabetes, insulin omission causing glycosuria in order to lose weight is the most commonly reported disordered eating behavior (304,305); in people with type 2 diabetes, bingeing (excessive food intake with an accompanying sense of loss of control) is most commonly reported. For people with type 2 diabetes treated with insulin, intentional omission is also frequently reported (306). People with diabetes and diagnosable eating disorders have high rates of comorbid psychiatric disorders (307). People with type 1 diabetes and eating disorders have high rates of diabetes distress and fear of hypoglycemia (308).

When evaluating symptoms of disordered or disrupted eating (when the individual exhibits eating behaviors that appear maladaptive but are not volitional, such as bingeing caused by loss of satiety cues), etiology and motivation for the behavior should be evaluated (303,309). Mixed intervention results point to the need for treatment of eating disorders and disordered eating behavior in the context of the disease and its treatment. More rigorous methods to identify underlying mechanisms of action that drive change in eating and treatment behaviors, as well as associated mental distress, are needed (310). Adjunctive medication such as glucagon-like peptide 1 receptor agonists (311) may help individuals not only to meet glycemic targets but also to regulate hunger and food intake, thus having the potential to reduce uncontrollable hunger and bulimic symptoms. Caution should be taken in labeling individuals with diabetes as having a diagnosable psychiatric disorder, i.e., an eating disorder, when disordered or disrupted eating patterns are found to be associated with the disease and its treatment. In other words, patterns of maladaptive food intake that appear to have a psychological origin may be driven by physiologic disruption in hunger and satiety cues, metabolic perturbations, and/or secondary distress because of the individual's inability to control their hunger and satiety (303,309).

Serious Mental Illness

Recommendations

5.48 Incorporate active monitoring of diabetes self-care activities into treatment goals for people with diabetes and serious mental illness. **B**

5.49 In people who are prescribed atypical antipsychotic medications, screen for prediabetes and diabetes 4 months after medication initiation and at least annually thereafter. **B**

5.50 If a second-generation antipsychotic medication is prescribed for adolescents or adults with diabetes, changes in weight, glycemic control, and cholesterol levels should be carefully monitored and the treatment regimen should be reassessed. **C**

Studies of individuals with serious mental illness, particularly schizophrenia and other thought disorders, show significantly increased rates of type 2 diabetes (312). People with schizophrenia should be monitored for type 2 diabetes because of the known comorbidity. Disordered thinking and judgment can be expected to make it difficult to engage in behavior that reduces risk factors for type 2 diabetes, such as restrained eating for weight management. Further, people with serious mental health disorders and diabetes frequently experience moderate psychological distress, suggesting pervasive intrusion of mental health issues into daily functioning (313). Coordinated management of diabetes or prediabetes and serious mental illness is recommended to achieve diabetes treatment targets. In addition, those taking second-generation (atypical) antipsychotics, such as olanzapine, require greater monitoring because of an increase in risk of type 2 diabetes associated with this medication (314–316). Because of this increased risk, people should be screened for prediabetes or diabetes 4 months after medication initiation and at least annually thereafter. Serious mental illness is often associated with the inability to evaluate and utilize information to make judgments about treatment options. When a person has an established diagnosis of a mental illness that impacts judgment, activities of daily living, and ability to establish a collaborative relationship with care providers, it is wise to include a nonmedical caretaker in decision-making regarding the medical regimen. This person can help improve the patient's ability to follow the agreed-upon regimen through both monitoring and caretaking functions (317).

Cognitive Capacity/Impairment

Recommendations

5.51 Cognitive capacity should be monitored throughout the life span for all individuals with diabetes, particularly in those who have documented cognitive disabilities, those who experience severe hypoglycemia, very young children, and older adults. **B**

5.52 If cognitive capacity changes or appears to be suboptimal for provider-patient decision-making and/or behavioral self-management, referral for a formal assessment should be considered. **E**

Cognitive capacity is generally defined as attention, memory, logic and reasoning, and auditory and visual processing, all of which are involved in diabetes self-management behavior (318). Having diabetes over decades—type 1 and type 2—has been shown to be associated with cognitive decline (319–321). Declines have been shown to impact executive function and information processing speed; they are not consistent between people, and evidence is lacking regarding a known course of decline (322). Diagnosis of dementia is also more prevalent in the population of individuals with diabetes, both type 1 and type 2 (323). Thus, monitoring of cognitive capacity of individuals is recommended, particularly regarding their ability to self-monitor and make judgements about their symptoms, physical status, and needed alterations to their self-management behaviors, all of which are mediated by executive function (323). As with other disorders affecting mental capacity (e.g., major psychiatric disorders), the key issue is whether the person can enter into a collaboration with the care team to achieve optimal metabolic outcomes and prevent complications, both short and long term (313). When this ability is shown to be altered, declining, or absent, a lay care provider should be introduced into the care team who serves in the capacities of day-to-day monitoring as well as a liaison with the rest of the care team (1). Cognitive capacity also contributes to ability to benefit from diabetes education and may indicate the need for alternative teaching approaches as well as remote monitoring. Youth will need second-party monitoring (e.g., parents and adult caregivers) until they are developmentally able to evaluate necessary information for self-management decisions and to inform resultant behavior changes.

Episodes of severe hypoglycemia are independently associated with decline, as well as the more immediate symptoms of mental confusion (324). Early-onset type 1 diabetes has been shown to be associated with potential deficits in intellectual abilities, especially in the context of repeated episodes of severe hypoglycemia (325). (See Section 14, "Children and Adolescents," https://doi.org/10.2337/dc22-S014, for information on early-onset diabetes and cognitive abilities and the effects of severe hypoglycemia on children's cognitive and academic performance.) Thus, for myriad reasons, cognitive capacity should be assessed during routine care to ascertain the person's ability to maintain and adjust self-management behaviors, such as dosing of medications, remediation approaches to glycemic excursions, etc., and to determine whether to enlist a caregiver in monitoring and decision--making regarding management behaviors. If cognitive capacity to carry out self-maintenance behaviors is questioned, an age-appropriate test of cognitive capacity is recommended (1). Cognitive capacity should be evaluated in the context of the age of the person, for example, in very young children who are not expected to manage their disease independently and in older adults who may need active monitoring of regimen behaviors.

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