

CME REPORT  
**Managing Type 2 Diabetes  
in Special Populations:  
Patient-Centered Treatment  
to Improve Outcomes**

*An Evidence-Based CME Consensus  
Recommendation from an Expert Panel*



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## ACKNOWLEDGMENTS

The New Jersey Academy of  
Family Physicians developed  
this program. The Academy  
wishes to thank medical writer  
Charles A. Goldthwaite, Jr.,  
PhD, project manager Jack  
Douglass, and graphic designer  
Karl Benner for their efforts in  
producing this material.

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**This Enduring Material activity, *Managing Type 2 Diabetes in Special Populations: Patient-Centered Treatment to Improve Outcomes (Enduring)***, has been reviewed and is acceptable for up to 2.00 Prescribed credit(s) by the American Academy of Family Physicians. Term of approval begins 06/01/2016. Term of approval is for one year from this date. Physicians should claim only the credit commensurate with the extent of their participation in the activity

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Lauren Curruth, MD has no relevant financial relationships.

## ACKNOWLEDGEMENT OF COMMERCIAL SUPPORT

This program is supported by an educational grant from Janssen Pharmaceuticals, Inc., administered by Janssen Scientific Affairs, LLC.

## DATE OF RELEASE AND TERMINATION DATE

The Date of Release for this activity is: June 1, 2016

The Terminate Date for this activity is: May 31, 2017

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## GENERAL OBJECTIVE

To enable primary care clinicians to integrate emerging antihyperglycemic agents into culturally-competent, patient-centered treatment strategies in the management of type 2 diabetes.

## SPECIFIC OBJECTIVES

At the end of this program, participants will be able to:

- *Employ culturally competent, patient-centered treatment strategies to manage type 2 diabetes in elderly, overweight/obese, or Latino/Latina patients.*
- *Employ strategies to overcome barriers that traditionally inhibit the initiation of care in these populations.*
- *Design safe and effective treatment strategies that are tailored to the individual needs of patients in these populations.*
- *Integrate emerging antihyperglycemic agents into patient-centered type 2 diabetes management plans for persons in these populations.*

## AT A GLANCE

- *Type 2 diabetes is a progressive disorder that affects numerous organs and tissues.*
- *Achieving and maintaining glycemic control is essential for managing diabetes and lowering the risk of its complications.*
- *Management of type 2 diabetes is multi-faceted and involves behavioral modifications (nutrition therapy, physical activity, awareness of disease), often carried out in conjunction with pharmacotherapy.*
- *Diabetes interventions should be individualized, use a treat-to-target approach, and involve the patient in the process of his/her disease management.*
- *Management should also incorporate cardiovascular risk reduction (e.g., blood pressure, lipid profiles, body weight).*
- *Episodes of hypoglycemia should be minimized for the safety of the patient.*
- *Attentiveness to specific patient characteristics (e.g., age, cultural background, body weight) will help family physicians and other primary care clinicians to design effective interventions for patients with type 2 diabetes, thereby engaging patients in their care plan and ultimately reducing complications and enhancing quality of life.*



## INTRODUCTION: DIABETES IN AMERICA

According to statistics released in 2014 by the Centers for Disease Control and Prevention (CDC),<sup>1</sup> more than 29 million US children and adults have diabetes, 8.1 million of whom are currently undiagnosed. Moreover, using data from fasting glucose and hemoglobin A<sub>1c</sub> levels, the CDC estimates that an additional 86 million American adults have pre-diabetes as defined by one of three measures: a hemoglobin A<sub>1c</sub> of 5.7-6.4%, fasting plasma glucose of 100-125 mg/dL, or post-load glucose of 140-199 mg/dL--levels that are higher than normal but not sufficiently elevated to be diagnosed as diabetes.<sup>2</sup> A major cause of heart disease and stroke, diabetes is the seventh leading cause of death in the United States.<sup>1</sup>

The American Diabetes Association (ADA) has estimated that diagnosed diabetes cost \$245 billion dollars in the US in 2012 (\$176 billion in direct medical costs plus \$69 billion in reduced productivity), accounting for roughly one in five healthcare dollars spent.<sup>3</sup> When undiagnosed diabetes, gestational diabetes, and pre-diabetes are included, the burden exceeds \$322 billion--more than \$1,000 for each American.<sup>4</sup> Persons with diabetes incur, on average, annual medical expenditures of \$13,700, of which nearly \$8,000 is directly attributed to diabetes. Individuals with diagnosed diabetes incur medical expenses that are approximately 2.3 times higher than corresponding expenditures in the absence of diabetes.<sup>3</sup> Projections by the International Diabetes Federation suggest that diabetes will exert a tremendous global burden in the next two decades, with an estimated 642 million adults worldwide having the disease by 2040.<sup>5</sup> Management of type 2 diabetes is multi-faceted and involves behavioral modifications, often carried out in conjunction with pharmacotherapy. Although glycemic control is essential to manage the disease and its complications, treatment must be individualized and aimed at a constellation of additional factors that affect cardiovascular health (e.g., blood pressure, lipid profiles, body weight). The burgeoning global diabetes epidemic means that family physicians and other primary care clinicians should expect to manage type 2 diabetes patients of all ages and ethnic backgrounds, each of whom will have unique treatment considerations.

To address the management of type 2 diabetes in special populations that will likely be seen in primary care, such as obese individuals, the elderly, and Latino/Latina patients, the New Jersey Academy of Family Physicians (NJAFP) assembled a panel of experts in 2015 to integrate emerging antihyperglycemic agents into culturally-competent, patient-centered treatment strategies to manage type 2 diabetes. To help clinicians understand issues

related to diabetes management in these populations, this publication will review current literature and guidelines and provide recommendations that can help clinicians develop successful personalized management plans for these patient populations.

## Part 1: Considerations for the Obese Patient

### EXCESS WEIGHT IS LINKED WITH TYPE 2 DIABETES AND OTHER ABNORMALITIES THAT INCREASE CVD RISK

According to data gathered in 2011-2012 as part of the National Health and Nutrition Examination Survey (NHANES), 34.9% of US adults aged 20 years and older were obese (defined as a body mass index [BMI]  $\geq 30$  kg/m<sup>2</sup>).<sup>6</sup> Obesity appears to affect certain sub-populations to a greater extent than others (*Table 1*). Most, but not all, patients with type 2 diabetes are obese,<sup>7</sup> and obesity contributes to insulin resistance, a hallmark characteristic of type 2 diabetes.

**Table 1. Obesity Rates by Ethnic Groups (United States, 2011-2012)<sup>6</sup>**

Population	Age-adjusted Obesity Rate
Non-Hispanic blacks	47.8%
Hispanics	42.5%
Non-Hispanic Whites	32.6%
Non-Hispanic Asians	10.8%

Excess weight rarely occurs in isolation. Individuals who are obese often present with a constellation of atherogenic abnormalities (*Table 2*) that increases the risk for coronary heart disease (CHD) and cardiovascular disease (CVD).<sup>8-11</sup> Although patients may present different specific combinations of risk factors, the factors nonetheless often cluster in predisposed individuals. Numerous studies indicate that CVD risk rises as the number of abnormalities increases.<sup>9, 10, 12-15</sup> As such, the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III recommends that identification of one CHD risk factor should prompt the search for others and prompt the healthcare provider to begin, proactive, aggressive treatment to reduce CVD risk.<sup>16</sup> To this end, NCEP ATP III classifies diabetes as a CHD risk equivalent--diabetes carries a risk for clinical CHD that is approximately equal to that of established CHD.<sup>16</sup> In 2012, the United States Preventive Services Task Force (USPSTF) recommended that providers screen all adults for obesity and offer or refer obese individuals for multicomponent behavioral treatment (see subsequent sections for details).<sup>17</sup> Waist circumference and BMI represent complementary assessments of risk, and their

combination can be used to stratify risk of chronic illnesses such as type 2 diabetes, hypertension, and CVD.<sup>18</sup> The ADA recommends that BMI be calculated and documented in the medical record at each patient encounter.<sup>19</sup>

**Table 2. Atherogenic Abnormalities Seen in Obese Patients**

- Insulin resistance
- Hyperinsulinemia
- Glucose intolerance
- Type 2 diabetes
- Hypertriglyceridemia
- Increased apolipoprotein B
- Small, dense, and high-density lipoprotein particles
- Hypertension
- Impaired fibrinolysis
- Susceptibility to thrombosis
- Low chronic inflammation state
- Endothelial dysfunction

Source: Despres JP, et.al. BMJ 2001;322:716-720.

### COMPONENTS OF AN EFFECTIVE INTERVENTION FOR PATIENTS WITH TYPE 2 DIABETES

The ADA has issued glycemic recommendations for adults with diabetes (*see callout box*),<sup>20</sup> noting that goals must be tailored to the individual patient and that providers must use clinical judgment when working with the patient to design an appropriate management plan.

#### 2016 ADA GLYCEMIC RECOMMENDATIONS FOR NON-PREGNANT ADULTS WITH DIABETES:<sup>20</sup>

A <sub>1c</sub> :	< 7.0*
Preprandial PG:	80-130 mg/dL*
Peak postprandial PG <sup>§</sup> :	< 180 mg/dL*

\*Individualize based on age/life expectancy, duration of diabetes, comorbid conditions, known CVD or advanced microvascular complications, hypoglycemia unawareness, and patient preferences. More or less stringent goals may be appropriate for some patients.

§Postprandial glucose may be targeted if A<sub>1c</sub> goals are not met despite reaching preprandial glucose goals. Postprandial glucose measurements should be made 1-2 h after the beginning of the meal, when levels generally peak in patients with diabetes.

In its 2016 *Standards of Medical Care in Diabetes*, the ADA notes that a strong body of evidence suggests that obesity management can delay the progression from prediabetes to type 2 diabetes and may be beneficial in treating type 2 diabetes.<sup>19</sup> Diabetes management, applied to individuals regardless of weight, consists of three overlapping components: 1) diabetes self-management education and support, 2) medical nutrition therapy (MNT; the process of establishing a tailored nutrition prescription), and 3) pharmacotherapy (for glycemic control and/or

complications). These topics are discussed in detail below. An updated and comprehensive discussion and recommendations related to supplementary weight-loss strategies, such as bariatric surgery or weight-loss pharmacotherapy, are available from the ADA.<sup>19</sup>

**DIABETES SELF-MANAGEMENT EDUCATION (DSME) AND SUPPORT (DSMS).** DSME and DSMS represent an interactive, ongoing educational process involving the person with diabetes and the educator(s), with a goal of helping patients make informed self-management decisions.<sup>7</sup> Each patient should receive an individualized assessment of his/her condition, identification of personal self-management goals, an educational plan and interventions, and periodic reassessments of progress and goals. In this process, the family physician or other healthcare provider should consider the patient's attitude and beliefs about diabetes when tailoring a treatment strategy. DSME has been associated with numerous beneficial outcomes, including improved self-care behaviors, lowered A<sub>1c</sub>, reductions in self-reported weight, healthy coping strategies, reduced cost, and improved quality of life.<sup>7</sup> Current ADA criteria for a DSME curriculum with successful learning outcomes include the following:<sup>21</sup>

- Describing the *diabetes disease process and treatment options*
- Incorporating *nutritional management and physical activity* into lifestyle
- Using *medications* safely and for maximum therapeutic effectiveness
- *Monitoring blood glucose* and other parameters and interpreting/using the results for self-management decision-making
- Preventing, detecting, and treating *acute and chronic complications*
- Developing personal strategies to address psychosocial issues/concerns and to promote health and behavior change

Diabetes self-management represents a partnership between the patient and provider. In 2012, the ADA and the European Association for the Study of Diabetes (EASD) released a joint position statement advocating for patient involvement in decision making with regard to type 2 diabetes management,<sup>22</sup> which was updated in 2015 to reflect current therapeutic options.<sup>23</sup> The ADA/EASD recommendations support a shared decision-making approach that applies to primary care practices and those practices that incorporate the patient-centered medical home (PCMH).<sup>\*</sup> For the patient, effectively managing type 2 diabetes requires collaboration, a personalized management plan, self-management education, adherence to treatment, and appropriate follow-up and monitoring. Successful approaches aimed at improving self-management are planned and feature defined targets and established goal-setting. Several approaches, including diabetes “mini-clinics,” structured behavioral interventions, multidisciplinary disease programs, and methods to improve organization and delivery of patient education, have been explored in primary

<sup>\*</sup>The PCMH is based on a “partnership” between the patient and healthcare providers that incorporates skills such as problem solving, decision making, resource utilization, action planning, and self-tailoring of interventions.

care settings to improve care for patients with diabetes.<sup>24, 25</sup> Patients with diabetes who have been managed through various PCMH programs have demonstrated improvements in disease-related factors such as A<sub>1c</sub>, blood pressure, and low-density lipoprotein (LDL) cholesterol, with concomitant reductions in medical costs and inpatient admissions.<sup>25</sup>

Persons with diabetes must self-monitor their blood glucose to prevent hypo- and hyperglycemia. Self-monitoring of blood glucose (SMBG) is a central component of diabetes management, because it enables patients to evaluate their individual response to therapy and assess whether glycemic targets are being achieved.<sup>20</sup> Integrating SMBG results into diabetes management can help to guide medical nutrition therapy and physical activity, prevent hypoglycemia, and adjust medications accordingly. Monitoring can help to show the effects of food choices, exercise, medications, and stress on blood sugar readings, and blood glucose should be monitored more often when adding or modifying a therapeutic regimen. Patients should be educated on ways to recognize, prevent, and treat hypoglycemia and to understand when continuous glucose monitoring may be beneficial.

**MEDICAL NUTRITION THERAPY (MNT).** MNT, an essential component of any DSME program, is the process of establishing a tailored nutrition prescription (preferably overseen by a registered dietitian or Certified Diabetes Educator (CDE) who is knowledgeable in providing diabetes MNT) based on an individual's medical, lifestyle, and personal factors.<sup>26</sup> Key components of MNT include caloric intake/portion control, weight loss and management through diet and physical activity, a consistent daily carbohydrate intake, balanced nutritional content, and effective meal timing. The process of MNT involves selecting an appropriate meal-planning approach and educational materials that consider a person's clinical or nutritional goals, ability or willingness to learn, motivation to change eating or behavioral habits, activity level, and lifestyle. MNT aims to achieve several goals (*see callout box, page 6*),<sup>7</sup> and compliance is critical for attaining glycemic control.

MNT promotes modest weight loss through a tailored program of lifestyle change.<sup>21</sup> Structured programs that include education, reduced intake of calories and fats, regular physical activity, and regular contact between the individual and the healthcare team can facilitate long-term moderate weight loss, thereby reducing hyperglycemia, dyslipidemia, and hypertension. Monitoring carbohydrate intake is a key strategy to achieving glycemic control. To achieve and maintain a healthy weight, the ADA recommends reducing saturated fat intake below 7% of the total caloric intake, minimizing intake of trans fats, increasing fiber, and avoiding high-protein diets.<sup>26</sup> Blood glucose monitoring provides the practical information to assess changes in MNT.

**PHARMACOTHERAPY.** For disease management, pharmacotherapy may be indicated in addition to a lifestyle regimen that promotes cardiovascular health.<sup>27, 28</sup> Options include oral and parenteral antihyperglycemic agents. Approved oral agents target various defects associated with type 2 diabetes, including insulin resistance, decreased insulin secretion, increased hepatic

## ADA GOALS OF MNT FOR ADULTS WITH DIABETES:<sup>7</sup>

- Promote and support healthy eating patterns, emphasizing various nutrient-dense foods in appropriate portion sizes to improve overall health and specifically to attain individualized glycemic, blood pressure, and lipid goals, achieve/maintain body weight goals, and delay/prevent complications from diabetes.
- Address individual nutrition needs based on personal and cultural preferences (e.g., the meaning and impact of food on family life), health literacy and numeracy, access to healthy food choices, willingness and ability to make behavioral choices, and barriers to change.
- Maintain the pleasure of eating by providing nonjudgmental messages about food choices.
- Provide the individual with diabetes with practical tools for developing healthy eating patterns (e.g., daily meal planning) rather than focusing on individual macronutrients, micronutrients, or single foods.

glucose output, and increased glucose uptake by the kidneys. Oral agents are indicated and commonly used in combination therapy regimens. Evidence-based strategies to incorporate pharmacotherapy into type 2 diabetes management have been generated by several professional organizations, including the ADA<sup>27</sup> and the American Association of Clinical Endocrinologists (AACE).<sup>28, 29</sup> Table 3 summarizes commonly-used classes of antihyperglycemic agents and their association with weight gain and hypoglycemia, side effects that commonly influence agent choice.<sup>27</sup>

All classes of antihyperglycemic agents are associated with side effects, some of which may be related to cardiovascular health. In particular, thiazolidinediones (TZDs) may cause edema and have been reported to be significantly associated with a higher risk of heart failure in adults with or at a high risk for type 2 diabetes.<sup>30</sup> While the risk of congestive heart failure (CHF) exacerbation is a concern with TZD use, the PROActive study (n=5,238), which assessed the effect of the TZD, pioglitazone, on the secondary prevention of macrovascular events in patients with type 2 diabetes, was the first to show a reduction in cardiovascular events (including myocardial infarction, stroke, and all-cause mortality) with an antihyperglycemic agent.<sup>31</sup> Clinicians are advised to use clinical judgement when considering TZDs as part of a management plan for patients with type 2 diabetes, especially in the setting of preexistent CHF.

Results from the placebo-controlled EMPA-REG OUTCOME Trial of 7,020 individuals with type 2 diabetes at high risk for cardiovascular events who received the SGLT2 inhibitor, empagliflozin (median observation time: 3.1 years), indicate that those who received the drug in addition to standard care had a lower rate of the primary composite cardiovascular outcome and of death from any cause, relative to placebo.<sup>32</sup>

While this relationship is still under investigation for other SGLT2 inhibitors, the EMPA-REG OUTCOME is the first unequivocally positive dedicated cardiovascular trial of an antihyperglycemic agent.

In 2015, the US FDA issued a safety warning announcement stating that SGLT2 inhibition may promote euglycemic diabetic ketoacidosis (euDKA), or high ketone levels in the blood observed with uncharacteristically mild or moderate glucose elevations.<sup>33</sup> This warning was predicated on reports from twenty cases of acidosis in US patients with type 1 and type 2 diabetes who were treated with SGLT2 inhibitors from March 2013 to June 2014 plus several hundred events reported worldwide. Diabetic ketoacidosis is a rare but serious condition that may require hospitalization, and family physicians and other healthcare providers should make patients aware of the potential for developing DKA if they prescribe an SGLT2 inhibitor. Patients who experience symptoms of DKA (e.g., difficulty breathing, nausea, vomiting, abdominal pain, confusion, and unusual fatigue or sleepiness) should be evaluated for acidosis, including ketoacidosis, regardless of the prevailing glucose value. If acidosis is confirmed, SGLT2 inhibitors should be discontinued, and treatment for DKA should be initiated with insulin. It should be noted that safety data regarding the use of SGLT2 inhibitors in individuals with type 2 diabetes continue to be collected and evaluated and that euDKA can be predicted, detected, and prevented in many patients with diabetes.<sup>34</sup> In the EMPA-REG trial, the risk of DKA was comparable between treatment arms (empagliflozin and placebo).<sup>32</sup>

In December 2015, the FDA added a safety warning for “serious urinary tract infections” to the SGLT2 labeling, citing reports from March 2013 through October 2014 of 19 cases of serious blood and kidney infections that began as urinary tract infections with SGLT2 use.<sup>35</sup> Patients who receive an SGLT2 inhibitor should be aware of signs and symptoms of a urinary tract infection, including a feeling of burning when urinating, a need to urinate frequently, pain in the lower abdomen or pelvis, fever, or blood in the urine.

It is important to note that in outcomes from the Action to Control Cardiovascular Risk in Diabetes (ACCORD) trial, which compared the effect of intensive therapy (targeting an A<sub>1c</sub> level below 6.0%) versus standard therapy (targeting an A<sub>1c</sub> level between 7.0% and 7.9%) on cardiovascular events in persons with long-standing type 2 diabetes who had or were at high risk for CVD, showed that intensive therapy for 3.5 years increased mortality yet did not significantly reduce major cardiovascular events.<sup>36</sup> The increased mortality occurred primarily in patients randomized to the intensive therapy arm, who continued to have elevated A<sub>1c</sub> despite every effort being made to establish glyce-mic control. Importantly, the intensively-treated cohort had a higher incidence of hypoglycemia that required assistance and experienced weight gain of more than 10 kg (P<0.001). This hypoglycemia may have contributed to the increased mortality in the intensive-therapy group, and clinicians would be wise to avoid hypoglycemia at whatever target glucose level is deemed appropriate for a given patient.

**Table 3. Association of Commonly-Used Antihyperglycemic Agents with Weight and Hypoglycemia Risk<sup>27</sup>**

Agent Class	Effect on Weight	Hypoglycemia Risk
Metformin/biguanide	Neutral/loss	Low
Sulfonylurea (SU)	Gain	Moderate
Thiazolidinedione (TZD)	Gain	Low
Dipeptidyl peptidase-4 (DPP-4) inhibitor	Neutral	Low
Sodium-glucose co-transporter-2 (SGLT-2) inhibitor	Loss	Low
Glucagon-like peptide-1 (GLP-1) receptor agonist*	Loss	Low
Insulin (basal)*	Gain	High

\*Injectable agents.

### CONSIDERATIONS FOR A TYPE 2 DIABETES MANAGEMENT PLAN

Because cardiometabolic risk factors tend to cluster, diabetes care extends beyond tight glycemic control. Managing type 2 diabetes should generally incorporate four areas:<sup>7</sup>

- 1) Lifestyle interventions for overweight and obese individuals that are geared toward an initial loss of 5-10% of baseline body weight through the combination of 150 or more minutes of physical activity per week (if the patient is capable) and a low-fat, ADA-appropriate reduced-calorie diet.
- 2) Management of cardiovascular risk factors (e.g., hypertension, dyslipidemia, and microalbuminuria) using aspirin, statins, and angiotensin-converting enzyme inhibitors/angiotensin-receptor blockers.<sup>37</sup>
- 3) Normalization of blood glucose levels, as monitored using A<sub>1c</sub> level.
- 4) Patient preferences and individualized care goals.

**COMBINED MODERATE WEIGHT LOSS AND PHYSICAL ACTIVITY LOWERS DIABETES RISK.** Results from the Diabetes Prevention Program (DPP) indicate that loss of 5-10% of body weight through lifestyle modification decreases progression to type 2 diabetes regardless of age, sex, or ethnicity.<sup>38-40</sup> In the DPP study, lifestyle therapy reduced the risk of developing type 2 diabetes among subjects with impaired glucose tolerance by 58% relative to placebo, nearly doubling that achieved by pharmacotherapy with metformin. Successful lifestyle therapy involves a low-fat/high-fiber diet, physical activity, and frequent intervention with dietitians or lifestyle coaches. In an extensive review of the literature, the National Heart, Lung, and Blood Institute (NHLBI)<sup>18</sup> concluded that the strength of evidence was high to support the following statements:

- In overweight and obese adults at risk for type 2 diabetes, average weight losses of 2.5-5.5 kg (5.8 – 12.2 pounds) at 2 or more years, achieved with lifestyle treatment (with or without orlistat), reduces the risk for developing type 2 diabetes by 30-60%.
- In overweight and obese adults with type 2 diabetes, 2-5 % weight loss achieved with 1 to 4 years of lifestyle treatment (with or without orlistat) results in modest reductions in fasting plasma glucose concentrations and lowering of A<sub>1c</sub> by 0.2-0.3%.
- In overweight and obese adults with type 2 diabetes, those who achieve greater weight loss at 1 year with lifestyle therapy (with or without orlistat) have greater improvements in A<sub>1c</sub>. Weight loss of 5-10% is associated with A<sub>1c</sub> reductions of 0.6-1.0% and reduced need for diabetes medications.
- In overweight or obese adults with or without elevated CVD risk, there is a dose-response relationship between the amount of weight loss achieved by lifestyle intervention and the improvement in lipid profile.

**ACHIEVING A BALANCED DIET.** Weight loss occurs when the amount of expended energy exceeds the caloric intake, while weight maintenance reflects a balance between intake and expenditure. For controlled weight loss, a healthy diet must create a daily deficit in energy (calories). Because each pound of adipose tissue stores approximately 3,500 calories,<sup>41</sup> a tailored diet that targets a deficit of 500 to 1,000 cal/day will promote the loss of 1-2 lbs/week.<sup>18</sup> Weight loss that exceeds this rate results in loss of water and muscle mass, thereby increasing health risks and encouraging weight regain.

Although caloric balance is the major determinant of weight loss, a healthy strategy requires more than simply cutting calories—nutritional balance and weight management are

complementary goals to weight loss. Effective management represents a long-term lifestyle change through the adjustment of daily eating habits. Thus, any diet should be planned to achieve a gradual but progressive weight loss, and dietary adjustments should enfold into an overall lifestyle regimen that includes physical activity (*see below for details*).

A low-calorie diet, with consideration given to the patient's food preferences, is the first step. According to evidence-based studies, the USDA reports that, in the absence of physical activity, any diet containing approximately 1,400 to 1,500 cal/day will result in weight loss, regardless of macronutrient composition.<sup>42</sup> In addition, reducing the portion of fat intake in the diet can promote a small decrease in body weight, BMI, and waist circumference.<sup>43</sup> However, the number of kcal/day necessary for weight loss or maintenance depends on the individual patient's usual caloric intake, and any caloric regimen must be tailored to the individual patient. A resource for patients to help design and track a healthy personal eating/activity plan is available at the US Department of Agriculture's "My Pyramid" website at [www.mypyramid.gov](http://www.mypyramid.gov). A detailed review of the evidence to support various dietary strategies is available from the NHLBI,<sup>18</sup> and the ADA provides detailed evidence-based MNT recommendations on macronutrient distribution.<sup>7</sup> For further consultation, a registered dietitian can be located through the Academy of Nutrition and Dietetics ([www.eatright.org](http://www.eatright.org)).

### **SIMPLE, HEALTHY DIETARY TAKE-HOME CONCEPTS FOR THE PATIENT:**

- *Drink a protein shake for breakfast rather than sodas or juice*
- *Plan and prepare meals at home rather than ordering take-out*
- *Pay attention to portion and serving sizes*
- *Select high-fiber foods when possible*
- *Choose broiled, boiled, or steamed food instead of fried*
- *Consider calorie-controlled meals as one part of an overall diet.*

**PROMOTING PHYSICAL ACTIVITY.** A recent meta-analysis of 47 randomized, controlled clinical trials indicates that structured exercise training (aerobic, resistance, or both) is associated with reduced A<sub>1c</sub> concentration in persons with type 2 diabetes.<sup>44</sup> This reduction was greater for persons who exercised at least 150 minutes per week. Structured exercise confers numerous health benefits (e.g., cardiovascular fitness, muscle strength, improved insulin sensitivity, increased mobility in overweight persons) for both the general population and individuals with type 2 diabetes.<sup>45</sup> The ADA recommends that adults with diabetes perform at least 150 min/week of moderately-intense aerobic physical activity (50–70% of maximum heart rate), spread over at least three days per week with no more than two consecutive days without exercise.<sup>7</sup> In the absence of contraindications, adults with type 2 diabetes should also be encouraged to perform resistance training at least twice per week.<sup>7</sup>

When helping patients to establish a physical activity regimen, the clinician should stress that activity does not necessarily equate with traditional exercise and may include walking, sports, and common chores (e.g., gardening, waxing a car, pushing a stroller, raking leaves). A useful physical activity goal is 30 minutes or more of moderate exercise each day. This activity is cumulative—to attain benefits, an individual need not complete the activity in a single, consecutive period. Thus, a person could walk 30 minutes once daily or split this level of activity in a manner that suits daily schedules (e.g., 10 minutes before work, 10 minutes at lunch or break, and 10 minutes after dinner). To encourage activity, the provider can ask a patient to wear a pedometer for a week and record the number of steps taken each day, with a target goal of achieving 10,000 steps per day. For patients with multiple CVD risk factors, physical activity should be initiated slowly and increased gradually, and any patient who is starting an activity program should be evaluated for cardiovascular fitness prior to commencement.

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**Persons with diabetes should complete 30 minutes or more of moderate exercise each day, which can be carried out in one session or a series of brief sessions.**

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As with dietary intervention, a physical activity plan should be tailored to the individual, with the understanding that each patient will progress through an activity regimen at an individual rate. Table 4 provides suggestions to increase physical activity during daily routines.

### **Table 4. Physical Activity Suggestions During Daily Routines**

- *Use stairs instead of the elevator*
- *Park farther away from work or shopping*
- *Walk at lunch time*
- *Exit public transportation one stop before the usual one*
- *Use a pedometer to count steps*
- *Limit television viewing to 1 hour per day*
- *When watching television, stand or walk during commercial breaks*

According to data from the National Weight Control Registry, most persons who lost significant weight and maintained the loss for more than one year report engaging in high levels of physical activity (~1 hour/day), eating a low-calorie, low-fat diet, eating breakfast regularly, self-monitoring their weight, and maintaining a consistent eating pattern across weekdays and weekends.<sup>46</sup> Although any intervention must be tailored to the patient's needs, all strategies to lose weight safely incorporate themes of variety, proportionality, moderation, and physical activity.



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**Losing 5-10% of body weight through lifestyle modification decreases progression to type 2 diabetes, regardless of a person's age, sex, or ethnicity.**

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**BEHAVIORAL MODIFICATIONS REQUIRE ACTIVE PATIENT PARTICIPATION.** Successful behavioral modification requires that the patient take responsibility for his/her actions by setting specific health/lifestyle goals and achieving them in large part through self-management. Numerous patient factors, including motivation level, support systems, time, stress level, and attitude toward physical activity can influence adherence to a given regimen. As such, the provider must assess the patient's readiness to undertake a lifestyle regimen (*see section on "Assessing Stages of Change" for discussion*).

Adherence relies on accountability; therefore, patients must be encouraged to use all possible tools to maintain momentum. When encouraging patients, the physician or other healthcare provider should recognize the emotional effect of living with diabetes—stress can affect insulin and blood glucose levels and undermine healthy eating, activity and self-monitoring schedules, and adherence to medications. A useful goal-setting starting point is to have the patient describe a typical day in his or her life that recounts eating habits, physical activity, and time considerations. The following strategies may be useful when working with a patient to develop a regimen with realistic goals:

- *Maintain a daily diet/exercise diary (which can be reviewed at follow-up visits)*
- *Identify (and, where possible, avoid) situations that may compromise goals and plans*
- *Recognize success at follow-up visits*
- *Identify a social network and support system (e.g., family and friends, group-visit intervention sessions, established organizations such as Weight Watchers®)*
- *Set realistic goals and a specific plan developed with patient input*
- *Establish a self-management action plan based on what the patient feels that he/she can achieve with high confidence.*

Numerous self-management goal-setting forms and tools for patients and providers (in English and Spanish) are available from the Robert Wood Johnson Foundation's Diabetes Initiative at: <http://diabetesnpo.im.wustl.edu/resources/topics/GoalSetting.html>.

In addition, numerous smartphone apps can assist with tracking calories and exercise, including GoMeals®, CalorieKing™, and MyFitnessPal™.

For those patients who are undertaking lifestyle transitions but do not wish to join established social support groups, the family physician or other healthcare provider should schedule frequent follow-up visits to assess progress.

**COMMUNICATION AND TEAM EFFORTS ENHANCE SUCCESS.** Managing long-term complications of type 2 diabetes requires continuing care and education; the patient and the entire healthcare team must communicate in an interactive, collaborative, and ongoing process. Care should be administered by a multi-disciplinary, primary care physician-facilitated team that may include a registered dietitian, a behaviorist, an exercise physiologist, an ophthalmologist, a pharmacist, a physician, a podiatrist, a diabetes educator, and other healthcare professionals. It is imperative that the patient interact frequently and regularly with team members. Certain healthcare professionals have special expertise in diabetes education; assistance in locating certified diabetes educators (CDEs) and creating a team is available from the American Association of Diabetes Educators at 1-800-TEAMUP4.

A supportive network for the patient is a key facet of a successful intervention. The DPP study, which featured 16 sessions with a registered dietitian within the first six months of treatment and at least one session every other month for the subsequent 30 months, demonstrated the effectiveness of intensive, face-to-face intervention in helping patients manage weight over a period of four years.<sup>47</sup> This intervention helped to promote an average 7% loss in body weight over the first year, 4% of which was maintained after four years.<sup>48</sup>

**AN INFORMED PATIENT IS AN EMPOWERED PATIENT.** Productive interactions between an informed, activated patient (and his/her family and caregivers) and a prepared health care team constitute a continuous healing relationship. An informed, activated patient understands the type 2 diabetes disease process and realizes his/her role in daily management. To optimize health outcomes and promote a high quality of life, the health care team must work to foster the patient's sense of control and responsibility. A prepared practice team will have relevant information, decision support, staff, equipment, and time required to deliver evidence-based clinical management and self-management support at the time of the patient visit.

**MOTIVATIONAL INTERVIEWING AND THE "5 A'S OF INTERVENTION.** Patients who are embarking upon a regimen of lifestyle/behavioral changes will arrive at the office in various stages of readiness. Clinicians are thus encouraged to practice motivational interviewing, an approach based on five general principles:<sup>49</sup>

1. Expressing empathy through reflective listening.
2. Developing a discrepancy between clients' goals or values and their current behavior.
3. Avoiding argument and direct confrontation.
4. Adjusting to client resistance rather than opposing it directly.
5. Supporting self-efficacy and optimism.

The provider can use the office model of the "5 A's" as an approach when designing an appropriate intervention. This model, which is commonly associated with interventions for smoking cessation, can be applied to any process of healthy behavioral/

lifestyle change, including those that enhance glycemic control. The “5 A’s” are **ask, advise, agree** and **assess, assist, and arrange**. The appropriate action by the physician or member of the healthcare team for each step is provided in Table 5. These strategies are not time-consuming and can be integrated smoothly into routine office visits and group-based diabetes interventions.

**Table 5. The “5 A’s”: An Intervention Strategy to Help Patients Achieve Behavioral Changes**

Step	Physician or Healthcare Team Action
Ask	Identify and document lifestyle habits and behaviors (including alcohol use)
Advise	Individualize and strongly urge a healthy lifestyle
Agree and Assess	Determine patient’s willingness to modify behavior, agree on goals and treatment plan
Assist	Aid in developing a tailored intervention
Arrange	Schedule follow-up contacts and offer support

**CONTROLLING HYPOGLYCEMIA.** When working with a patient to tailor a diabetes management program, clinicians should aim to strike a balance between achieving glycemic control and limiting episodes of hypoglycemia. To this end, the ADA notes that, “Severe or frequent hypoglycemia is an absolute indication for the modification of treatment regimens, including setting higher glycemic goals.”<sup>20</sup> Hypoglycemia manifests with various symptoms (**Table 6**) and can occur suddenly. While mild hypoglycemia may be inconvenient or frightening, severe hypoglycemia can lead to seizures or coma, causing falls, motor vehicle accidents, or other injury.<sup>50</sup>

Patients with diabetes must learn to recognize symptoms that presage a hypoglycemic episode. Family physicians and other healthcare providers, in turn, must assess their elderly patients’ functional status and discuss with the patient the degree to which he or she experiences such episodes. To assist with this process, the ADA and the Endocrine Society have created a hypoglycemia patient questionnaire and a clinician documentation checklist that are useful in primary care.<sup>51</sup>

Hypoglycemia can be treated by ingesting foods that contain glucose or carbohydrates, with the former being preferred if readily available. However, patients must learn to recognize situations that increase their risk of hypoglycemia (e.g., fasting, exercise, sleep) and take precautions accordingly (e.g., bedtime snacks to prevent overnight hypoglycemia,

exercise management, medication adjustments, glucose monitoring).

**Table 6. Symptoms Commonly Associated with Hypoglycemia<sup>50</sup>**

**During Waking Hours:**

- Hunger
- Shakiness
- Nervousness
- Sweating
- Dizziness or light-headedness
- Sleepiness
- Confusion
- Difficulty speaking
- Anxiety
- Weakness
- Palpitations (tachycardia)

**During Sleep:**

- Crying out or having nightmares
- Finding pajamas or sheets damp from perspiration
- Feeling tired, irritable, or confused after waking up

## Part 2: Providing Culturally-Appropriate Type 2 Diabetes Management

Diabetes disproportionately affects minority populations in the US. Whereas 7.6% of non-Hispanic white US adults had diagnosed diabetes in 2012, the age-adjusted rates of diagnosed diabetes were higher for Asian-Americans (9.0%), Hispanics (12.8%), non-Hispanic blacks (13.2%), and American Indians/Alaska Natives (15.9%).<sup>1</sup> Primary care physicians can therefore expect to treat patients with type 2 diabetes who represent a spectrum of ethnic backgrounds and cultures. Being aware of the culturally-influenced belief systems and mores of the patient and his or her family will promote successful dialog and facilitate disease management.

This section focuses on providing culturally-appropriate care to the Latino/Latina patient with type 2 diabetes. In this context, “Latino” refers to any person, born in the US or abroad, for whom the Spanish language or culture is an identifying characteristic, regardless of the person’s specific ancestry. Latinos may trace their ancestry to Europe, the Americas, Africa, or Asia. According to data recently released by the US Census Bureau, the Hispanic or Latino Origin population is projected to be the third-fastest growing in the US between 2014 and 2060, increasing by 115%, from 55 million in 2014 to 119 million in 2060.<sup>52</sup> In 2014, Hispanics are projected to account for 17% of the US population but will make up 29% of the population by 2060.

**BARRIERS AND FACILITATORS TO CARE FOR MINORITY PATIENTS.** There is evidence to suggest that barriers to care

(and, conversely, facilitating factors) reflect characteristics of the physician or other healthcare provider and of the patient. Physician-related barriers include the need to educate the patient, validating patient experiences, medical knowledge, accessibility/availability, and interpersonal skills.<sup>53</sup> Patient-related barriers include health literacy level, language proficiency, denial or fear of illness or medication, family experiences, and the patient's level of self-efficacy.<sup>53, 54</sup>

Appreciating the value system associated with cultural heritage is necessary to begin a conversation with a patient who presents with diabetes symptoms. Minority patients may respond to a holistic biopsychosocial approach that emphasizes patient care by recognizing biological, psychological, and faith-based components. Such an approach encourages an ongoing, active partnership between the patient and the physician in which treatment is structured to account for the patient's value system. Patients must be given a framework to understand their condition that takes into account the level of disease severity and realistic treatment options. Communicating effectively with a given patient depends to an extent on the individual and his/her relationship with the family physician or other healthcare team member. Nonetheless, an engaged attitude, based on active listening, is central to a successful relationship. Showing the patient that you care promotes trust; invoking a paternalistic approach may create a barrier to providing appropriate care.

To assess the degree of a patient's health literacy, language proficiency, and to better understand cultural factors, it may be useful to have the patient repeat your statements in their own words. While this "teach-back" approach may require a bit of extra time, demonstration of understanding may be justified in terms of adherence to an intervention.<sup>55</sup> It is also useful to ask the patient to bring with them all of the medications (prescription or herbal) that they currently take.

### SAMPLE QUESTIONS TO ASK WHEN INTERVIEWING A LATINO/LATINA PATIENT

- *What do you understand about why you are here today?*
- *How do you feel about your body?*
- *What do you know about your disease?*
- *How has diabetes affected your life or that of family members?*
- *What do you understand about diabetes/What does diabetes mean to you?*
- *What do you like to eat/drink/snack on?*

**CREATING A CULTURALLY-INFORMED OFFICE.** Establishing a culturally-informed office environment is the first step toward providing culturally-appropriate care. Attitudes toward diabetes and its treatment are influenced by cultural beliefs and norms. Some cultures may deny the existence of diabetes as a medical condition, while others may discourage the patient from seeking necessary help. A primary care practice will serve patients whose cultural norms vary widely with respect to disease causation, acceptable forms of treatment, spiritual beliefs, and

family structure and member roles— factors that can impact the diagnosis and treatment of diabetes and its comorbidities.

While it is impossible to understand the nuances of every cultural milieu that will be encountered in primary health care, the physician and other primary care clinicians must be knowledgeable of patterns and trends in their patient's cultural beliefs in order to communicate effectively with minority populations commonly encountered in a culturally-diverse practice. Individuals within specific ethnic groups may exhibit substantial differences in the degree of their sensitivities toward prevailing American culture. For example, recent immigrants may exhibit cultural sensitivities that differ widely from those seen in native-born patients of the same heritage, and Spanish-speaking patients may represent the diverse cultural backgrounds of their home countries (e.g., Guatemala, Mexico, Puerto Rico, Dominican Republic, Cuba, Nicaragua, Colombia).

Components of a culturally-informed office include:

- *An appropriate physical environment (e.g., language- and topic-appropriate magazines for adults, books and toys appropriate to children)*
- *A staff to match the patient population served*
- *Bilingual or language-appropriate wall posters and signs, with written text geared for comprehension*
- *Trained medical interpreter (if available) or access to interpretation services*
- *A staff trained in cultural competence*
- *Staff trained to overcome cultural misconceptions*
- *Recognition of culturally-observed holidays (e.g., Cinco de Mayo [May 5] or the Three Kings [January 6] for Latino cultures).*

English language reading capacity should be evaluated in cases where language barriers or health literacy barriers may pose communication issues. To facilitate comprehension, it is recommended that written text be accessible to a wide audience in terms of reading level. Federal law (Title VI of the Civil Rights Act) mandates that recipients of Federal funds, such as Medicare or Medicaid providers, offer language assistance for those individuals with Limited English Proficiency (LEP).<sup>56</sup> This provision includes the use of interpreter services (for oral communication) and translation services (for written communication). In the absence of a qualified medical interpreter, LEP patients are at risk for medical errors, misdiagnoses, poor patient-clinician communication, less adherence to clinical instructions, and reduced quality of care.<sup>57, 58</sup>

**CONSIDERATIONS FOR PROVIDING CULTURALLY-APPROPRIATE CARE.** When providing care, the clinician should be aware of cultural considerations, including:<sup>55</sup>

- *Educational level and health literacy*
- *Family integration and support systems*
- *Cultural judgments about disease and norms regarding body image*
- *Knowledge about diabetes*

- Learning styles and motivational strategies
- Spiritual beliefs (e.g., fatalismo, or the belief that events are predetermined by fate)
- Nutritional preferences
- Alternative/herbal practices (e.g., use of curanderos [healers])
- Language issues

**THE SUCCESSFUL CROSS-CULTURAL INTERVIEW.** An interview with a patient from another culture should be carried out carefully and appropriately to establish trust. Key elements of such an interview include:

- Establish trust through “small talk”
- Use open body language
- Speak slowly and directly to the patient (rather than to the interpreter)
- Use short sentences and a normal tone of voice
- Avoid use of idioms
- Ask patient what illness means to her and about her current treatments
- Provide treatment instructions in writing (in English or the patient’s native language if possible)
- Have patient repeat instructions in his/her own words.

### SAMPLE CROSS-CULTURAL INTERVIEW QUESTIONS:<sup>59</sup>

- What is your native country?
- What is your preferred language?
- How long have you been here?
- What do you think is wrong?
- What do you call the illness?
- What do you think has caused the illness?
- Why do you think that the illness began when it did?
- What problems do you think that the illness causes?
- How severe is your illness?
- What kind of treatment do you think is necessary?
- What are the most important results you hope to receive from this treatment?
- What do you fear most about the illness?
- How do you cope with your feelings?
- What can you change?
- What types of support do you have to help you deal with this illness?

**DELIVERING CULTURALLY-INFORMED CARE TO LATINO PATIENTS.** Cultural beliefs toward diabetes shape all aspects of the interaction between the Latino patient and the provider, and cultural idioms may surface often during conversation. A Latino patient may not complain of diabetes symptoms outright; instead, he or she may focus complaints around somatic symptoms such as anxiety or stomach ache. Illness may also be perceived as the result of an imbalance between external and internal sources (e.g., hot and cold, body and soul).<sup>55</sup> The provider should recognize that some Latinos remain strongly grounded in the folk-healing traditions of their home cultures; some patients may seek or have sought the assistance of a *curandero* (folk healer) to

alleviate symptoms. Furthermore, the process of acculturation may also lead some Latino patients to define certain diseases using folk idioms (e.g., *empacho* or stomachache) while characterizing others according to Western medical criteria (e.g., measles, asthma).

Moreover, the physician or other healthcare clinician must pay careful attention to accommodate the support systems that will likely serve the Latino patient who is coping with a chronic illness. For example, spiritual belief may play a central role in treatment. Latinos may believe that a higher being/authority determines the outcome of treatment or the course of the disease, regardless of the efficacy of recommended interventions (*fatalismo*). Accepting the diagnosis of diabetes may be difficult for the Latino patient, and clergy may serve as key members of the education process necessary for optimal treatment. A broad base of potential counseling sources may be appropriate for minority patients; if a Latino patient is amenable to working with clergy or a social worker, this option should be incorporated into the treatment plan. The provider should also recognize the central role of the immediate and extended family (*familismo*) as a source of emotional support during treatment and recovery processes. Therefore, when possible, the provider should engage the family in discussions that involve decisions about care, recognizing also that family members may draw upon their own spirituality to cope with a relative’s chronic illness. The influence of social and spiritual support suggests that providers must access the local world of their patients and their families to provide culturally-responsive care to Latino patients.

With Latina patients, the primary care physician should also recognize an issue with potential to confound diagnosis and/or treatment of diabetes--the central role played by male family members (especially among individuals who have recently come to the US). Husbands may make the health care decisions for their wives and family. Additionally, women may depend upon their husbands to drive them to the clinic. These issues underscore the need for a trained medical interpreter (who is not a member of the patient’s family); nodding of the patient’s head may signify that she is listening but not necessarily that she understands.

**Materials for managing type 2 diabetes that are targeted toward the Latino patient (including cookbooks, community-based workshops, and other materials) are available from the ADA through its “Por tu familia” campaign, online or at 1-800-DIABETES.**

## Part 3: Considerations for the Elderly Patient

The provider should evaluate elderly patients with diabetes as he/she would for younger patients in terms of assessing comorbid factors, the patient’s level of understanding of the disease, and the individual’s ability to self-monitor blood glucose and set and adhere to treatment goals. As discussed previously in this monograph, interventions should be tailored and include

appropriate lifestyle modifications and pharmacotherapy where necessary. While a thorough discussion of treating geriatric individuals with diabetes is beyond the scope of this monograph, several points should be noted. First, aging itself is not a risk factor for developing diabetes, and glucose intolerance should not be conceptualized as an inevitable outcome of growing old.<sup>60</sup> Moreover, many elderly patients who have diabetes or its complications are not obese, and structured interventions may be needed to be designed around and healthy, balanced nutritional intake rather than weight loss.

Elderly patients may also exhibit a greater degree of diabetic complications as a result of aging-associated metabolic changes or the cumulative effects of long-standing disease. Diabetes is a major cause of morbidity and mortality in the elderly, and poor glycemic control increases risk for cardiovascular events and can impact immune system function and cognition.<sup>60</sup> In particular, hypoglycemia can have a pronounced impact on elderly patients, who may be particularly vulnerable to its consequences, either through limited capacity to recognize hypoglycemic symptoms or through clinical complications and comorbidities that can be exacerbated by hypoglycemia. Elderly patients who experience hypoglycemic episodes may be physically frail and thus risk potentially serious physical injury from falls or other accidents. As noted previously, a well-tailored diabetes intervention must minimize hypoglycemic episodes, a facet of treatment that should be emphasized for the elderly patient. In its 2016 Standards of Medical Care in Diabetes, the ADA provides a framework for considering treatment goals for glycemia and other CVD risk factors in older adults with diabetes.<sup>61</sup>

## ADDITIONAL RESOURCES FOR PATIENTS AND PROVIDERS

Numerous resources for patients and healthcare providers are available online for the management of type 2 diabetes and the maintenance of cardiovascular and metabolic health (*Table 7*).

## CONCLUSION

Type 2 diabetes is a progressive disorder that affects numerous organs and tissues. Management of type 2 diabetes is multifaceted and involves behavioral modifications and interdisciplinary care (nutrition therapy, physical activity, awareness of disease), often carried out in conjunction with pharmacotherapy. Although glycemic control is essential for managing the disease and lowering the risk of its complications, treatment must be individualized and aimed at a constellation of additional factors that affect cardiovascular health (e.g., blood pressure, lipid profiles, body weight). Because diabetes is a chronic condition, management strategies should treat-to-target while minimizing hypoglycemic episodes. Patients should be involved in the disease management process as early as possible, informed with culturally-appropriate considerations. An individualized and tailored approach will facilitate the patient's involvement in his/her treatment and promote successful long-term outcomes. Attention to specific patient characteristics (e.g., age, cultural background, body weight, comorbidities) will help the family physician and other primary care clinicians to design effective interventions for patients with type 2 diabetes, thereby reducing complications and enhancing quality of life.

**Table 7. Online Resources for Patients and Providers**

Organization	URL	Resources
American Diabetes Association	<a href="http://www.diabetes.org">www.diabetes.org</a>	<ul style="list-style-type: none"> <li>• General information about diabetes</li> <li>• Nutrition and recipes</li> <li>• Weight loss/ exercise strategies</li> <li>• Preventive tools (risk calculators)</li> <li>• Current statistics and research findings</li> </ul>
American Academy of Family Physicians	<a href="http://www.aafp.org">www.aafp.org</a>	<ul style="list-style-type: none"> <li>• CME materials</li> <li>• Clinical practice guidelines</li> <li>• Practice management journals</li> <li>• Materials to support PCMH qualifications in practice</li> </ul>
American Academy of Family Physicians	<a href="http://www.familydoctor.org">www.familydoctor.org</a>	<ul style="list-style-type: none"> <li>• Patient resources</li> </ul>
American Association of Diabetes Educators	<a href="http://www.diabeteseducator.org">www.diabeteseducator.org</a>	<ul style="list-style-type: none"> <li>• Information on diabetes education accreditation</li> <li>• Location of diabetes educators</li> <li>• CME/online courses</li> </ul>
American Association of Clinical Endocrinologists/ American College of Endocrinology	<a href="http://www.aace.com">www.aace.com</a>	<ul style="list-style-type: none"> <li>• Treatment guidelines and algorithms</li> <li>• CME materials</li> </ul>
Academy of Nutrition and Dietetics	<a href="http://www.eatright.org">www.eatright.org</a>	<ul style="list-style-type: none"> <li>• Dietitian locator service</li> <li>• Nutrition education materials geared to specific populations (e.g., men, women, parents, seniors)</li> </ul>

## Case Study #1: Henry

### (newly diagnosed with diabetes)

Henry is a 60-year-old African-American lawyer who has never been diagnosed with diabetes. However, at a recent church-sponsored health screening, he found out that he has high blood sugar (random plasma glucose = 229 mg/dL), which has prompted him to visit the office as a new patient. His BMI is 35.0 kg/m<sup>2</sup>, and his blood pressure is 130/80 mm Hg. He has been taking an ACE inhibitor and a calcium-channel blocker for more than ten years. His estimated glomerular filtration rate (eGFR) is 79 mL/min/1.73 m<sup>2</sup>, and his creatinine level is 1.2 mg/dL. His A<sub>1c</sub> is currently 9.2%. When asked if he has experienced any unusual symptoms of late, he mentions that he has been waking up at night to urinate fairly frequently and that he has lost three pounds in the last couple of months. He nonetheless expresses concern about his weight and does not want to take any medications that cause weight gain. He also states that he “could do better” with regard to his diet, and he drinks six sodas per day while at work.

**According to ADA guidelines, which of the following is a reasonable A<sub>1c</sub> goal for Henry?**

- a) < 5.2%
- b) < 6.2%
- c) < 6.5%
- d) < 7.0%
- e) < 8.0%
- f) < 9.0%

**[Answer: d. The ADA recommends a goal of less than 7.0% for most adults aged 40-75 with diabetes.]**

**How should you initially counsel Henry at this point?**

- a) Help him locate a Certified Diabetes Educator (CDE) who can teach him about diabetes self-management and a dietitian who can help him promote healthy eating habits
- b) Discuss the importance of maintaining a healthy lifestyle
- c) Tell him that he will likely need to incorporate some form of pharmacotherapy to manage his disease
- d) Ask about symptoms of diabetic ketoacidosis
- e) All of the above

**[Answer: e. Henry should be made aware of the components of a successful diabetes intervention and understand that his treatment will be multi-faceted. He should receive formal instruction in principles of disease management. Given that Henry is symptomatic of diabetes, it will also be useful to counsel him about DKA.]**

**Henry reports that he is motivated to manage his weight and get into shape, as he has recently begun dating a younger woman. You ask him about the types of activity that he enjoys. What could you recommend for him in terms of incorporating physical activity into his daily routine?**

- a) Taking the stairs rather than the elevator at work
- b) Parking farther away from the building at work
- c) Consider joining a local sports league
- d) Wearing a pedometer or activity monitoring device (e.g. FitBit) to measure steps per day
- e) All of the above

**[Answer: e. All of these suggestions are viable. You should ask Henry about his preferences and should expect to negotiate an agreement.]**

Although you will connect Henry with a CDE for a comprehensive nutrition evaluation, you also recommend several small adjustments to his diet, such as switching from soda to coffee or tea, limiting fast-food intake and snacks, and controlling portion sizes when eating at restaurants. This is also a great time to discuss options for medications.

**Which of the following classes of antihyperglycemic agents are NOT associated with weight gain?**

- a) Sulfonylurea
- b) SGLT2 inhibitor
- c) Thiazolidinedione
- d) Biguanide/Metformin
- e) b and d only

**[Answer: e. SGLT2 inhibitors are associated with weight loss, and metformin is weight-neutral. Weight gain is a side-effect of sulfonylureas and TZDs.]**

**Based on Henry's status, which of the following is a suitable initial intervention to help Henry manage his diabetes and lower CVD risk?**

- a) No changes at present
- b) Lifestyle changes only
- c) Lifestyle changes plus metformin
- d) Lifestyle changes plus metformin and a second agent
- e) Lifestyle changes plus basal insulin

**[Answer: d. Lifestyle changes are indicated going forward, regardless of pharmacotherapy. It is reasonable to assume that metformin alone will be insufficient to reach Henry's target A<sub>1c</sub> while promoting weight loss. At this point, it is viable to initiate a dual oral regimen, with the understanding that insulin may be necessary at some future point.]**

Despite your recommendation for dual therapy, Henry opts initially for metformin only. You schedule a consult with a CDE in one week and follow up with Henry in three months to assess his progress. At his follow-up visit, he has lost five pounds, and his A<sub>1c</sub> is now 8.3%. He reports feeling great and has no further polyuria or nocturia. He then asks to initiate a second agent to sustain his momentum. You offer him several options, depending upon whether he wishes to use an oral agent or is comfortable with injections. You schedule another follow-up visit in three months.

## Case Study #2: Gloria

### (diagnosed with diabetes but has worsening glycemic control)

Gloria is a 63-year-old Latina homemaker, originally from Matamoros, Mexico. She is the matriarch of her family and comes to the office for a routine follow-up visit. Although she speaks some English, Spanish is her preferred language. She has brought her 14-year-old granddaughter with her to assist with language translation. She currently takes care of three grandchildren, ages 7, 10, and 14, and is responsible for preparing the family's meals.

Gloria was diagnosed with type 2 diabetes three years ago and has been taking metformin for two years (although she reports that she does not always take her metformin tablets each day). She also takes an ACE inhibitor to control her blood pressure. Her  $A_{1c}$  is 8.1%, up from 7.1% at her most recent visit one year ago. Upon your recommendation, she increased her dose of metformin from 500 to 1000 mg twice daily. Additionally, Gloria has gained 13 pounds since her last visit, increasing her BMI from 28.3 kg/m<sup>2</sup> to 30.9 kg/m<sup>2</sup>. Her blood pressure is 153/96 mm Hg. A kidney function panel reveals a creatinine of 0.8 mg/dL and an estimated glomerular filtration rate (eGFR) of 80 mL/min/1.73 m<sup>2</sup>. Her random blood glucose, measured at the office two hours after breakfast, is 202 mg/dL.

You suggest an additional agent to improve glycemic control. Gloria states that she does not want to inject insulin as part of her therapy because her mother died from diabetes complications soon after she initiated insulin treatment. She does not present with any other macrovascular or microvascular complications of diabetes and has no other comorbidities or microalbuminuria.

**According to ADA guidelines, which of the following may be a reasonable  $A_{1c}$  goal for Gloria?**

- a) < 6.0%   b) < 6.5%   c) < 7.0%   d) < 7.5%   e) < 8.0%

**[Answer: c. The ADA recommends a goal of less than 7.0% for most adults with diagnosed diabetes.]**

**You ask Gloria to describe an average day in her life and to discuss any changes that may have occurred since her previous visit one year ago. She states that she spends more time taking care of her grandchildren and feels that she does not get as much opportunity to go for walks than she did previously. She says that she has not changed her diet in the previous year. Based on Gloria's symptoms and random blood glucose, should you work with her to develop or adjust a lifestyle modification program at this point?**

- a) Yes. Lifestyle modifications and diabetes education to promote healthy weight loss and physical activity will be a cornerstone of her tailored intervention, regardless of disease severity or pharmacotherapy.  
b) No. Lifestyle modifications are optional at this point, although she will likely need to adjust her medications.  
c) No. Given Gloria's random blood glucose, she should begin insulin therapy immediately.

**[Answer: a. Lifestyle changes, including diet, physical activity, and social support designed to support behavioral**

**change, are the mainstay of management over the entire disease continuum.]**

**You mention to Gloria that she will need to incorporate lifestyle changes to control her hyperglycemia and reduce her risk of heart disease. She states that her children gave her a blender/juicer for her birthday, but that she has not used it very much. What are some concrete suggestions that you could offer in terms of dietary and activity changes that would incorporate into Gloria's current life?**

- a) Incorporate walking into daily life (e.g., at the mall, around the block, in place during TV commercials)  
b) Obtain a Spanish-themed diabetes cookbook  
c) Consider subtle changes to meals/staples that she prepares for her family (e.g., substitute turkey for beef, use less sugar in coffee, limit the number of sugar-sweetened drinks available at the house)  
d) Encourage eating raw whole foods or vegetables  
e) All of the above

**[Answer: e. Any of these suggestions could work for Gloria. It will be important to listen to her feedback and to incorporate her suggestions for changes as well.]**

**What else can you do to help Gloria make these lifestyle changes?**

- a) Arrange for her to receive counseling from a Certified Diabetes Educator (CDE) on principles of self-management and with a dietitian to help achieve controlled weight loss  
b) Suggest using community resources (e.g., church, community center) as needed  
c) Consider group-based diabetes therapy/ participation in a support group  
d) Stress to her and to her granddaughter the important role that the family will play in this process  
e) All of the above

**[Answer: e.]**

**True/False: Once Gloria reaches her target blood sugar, she will likely be able to discontinue the lifestyle changes and maintain this target level using medication alone.**

**[Answer: False. Lifestyle interventions will be the foundation of her management, regardless of medications. The lifestyle changes will extend beyond diabetes management to lower her risk of CVD.]**

**Once you and Gloria have agreed on an initial lifestyle regimen (with the understanding that the regimen will evolve), what else should you do to help her achieve glycemic targets?**

- a) Nothing at this point; lifestyle changes should be sufficient  
b) Discontinue metformin and replace with a sulfonylurea  
c) Add a second oral agent  
d) Add insulin

**[Answer: c. It is apparent that metformin alone is insufficient to control Gloria's hyperglycemia. While lifestyle changes will have multiple positive effects, Gloria should also intensify her pharmacotherapy regimen. Sulfonylureas have been associated with**

weight gain, suggesting that this class of agents may be suboptimal for Gloria. Insulin, while clearly the most effective hypoglycemic agent, would likely be associated with further weight gain. A second oral agent can be added to lower  $A_{1c}$  in the near-term.]

**Which of the following classes of oral antihyperglycemic agents are viable considerations as second-line agents for Gloria that would complement her lifestyle modifications?**

- a) Sulfonylurea
- b) SGLT2 inhibitor
- c) DPP-4 agonist
- d) Thiazolidinedione
- e) b and c only
- f) All of the above

[Answer: e. SGLT2 inhibitors and DPP-4 agonists are associated with weight loss or are weight-neutral, respectively, which will help Gloria to achieve her lifestyle goals. Sulfonylureas and thiazolidinediones are associated with weight gain.]

At this point, you prescribe a second oral agent in addition to the lifestyle recommendations. SGLT2 inhibitors offer an advantage over DPP-4 agonists in terms of a greater association with weight loss, although both categories could suit Gloria's needs. A follow-up visit should be scheduled in one month to assess her progress and to make adjustments to her therapy. You should note that significant lifestyle changes (particularly in terms of dietary and exercise patterns) that lead to a planned, sustained loss of 5-10% of body weight could impact her medication regimen.

### Case Study #3: Sabeena (reports frequent "dizzy spells")

Sabeena is a retired 84-year-old Asian-Indian female who visits the office seeking relief from pain associated with a hip fracture one year ago. Residual pain from the fracture has rendered her relatively sedentary compared to her pre-fracture activity level. The fracture occurred when she fell during what she terms a "dizzy spell." These "dizzy spells" occur with varying degrees of severity often enough that her family has to assist her several times each month. She was diagnosed with diabetes two years ago, and is currently taking a sulfonylurea. Her  $A_{1c}$  is 6.8%, and her BMI is 24.2 kg/m<sup>2</sup> (up from 22.0 kg/m<sup>2</sup> prior to the fracture). Her blood pressure is 109/60 mm Hg. Her creatinine level is 1.5 mg/dL, and her eGFR is 35 mL/min/1.73 m<sup>2</sup>. She reports that she does not check her blood sugar very often.

**Given this information, which factor takes the highest immediate priority in Sabeena's management?**

- a) Reducing or eliminating "dizzy spells," which may be caused by hypoglycemia
- b) Maintaining  $A_{1c}$  to a target of 7.0%
- c) Controlling blood pressure
- d) Maintaining healthy weight

[Answer: a. At this juncture, you should consider the risks and benefits of various strategies. Her weight is normal, and her blood pressure is not elevated. Given her age and her glucose control, maintaining  $A_{1c}$  at any cost is not an imperative in Sabeena's case. However, the "dizzy spells" have impacted her quality of life already and represent an immediate and unpre-

dictable threat to her health.]

**To address Sabeena's "dizzy spells," how should you proceed?**

- a) Add a second oral antihyperglycemic agent to the sulfonylurea
- b) Switch the sulfonylurea for another class of agent
- c) Discontinue the sulfonylurea for several months and observe results
- d) Add an ACE inhibitor

[Answer: c. Hypoglycemia is an established side effect of sulfonylureas, so discontinuing the sulfonylurea could provide insight into whether these "spells" are promoted by the agent. Switching immediately to another antihyperglycemic agent may not give a clear answer as to whether the episodes are related to medication. Given that Sabeena's glycemia is reasonably controlled, you should explain to her why you wish to discontinue the agent for several months.]

You recommend that she discontinue the sulfonylurea for three months and return for a follow-up visit. You could also recommend appropriate activity (e.g., water exercises), and you ask her to take note when she has "dizzy spells."

**Sabeena returns in three months. Her  $A_{1c}$  is now 7.4%, and her BMI is 23.9 kg/m<sup>2</sup>. She reports that she has experienced only "a couple of spells" and that they have not been debilitating, as many of her spells were during the previous year. However, her  $A_{1c}$  has increased. What is a target  $A_{1c}$  value for Sabeena?**

- a) < 7.0%
- b) < 7.5%
- c) < 8.0%
- d) < 6.5%
- e) The lowest value that can be attained safely while avoiding hypoglycemia.

[Answer: e. Although the ADA suggests  $A_{1c}$  targets for the general patient population, targets for each individual must account for specific complications and comorbidities. In Sabeena's case, controlling hypoglycemia will drive the value of the glycemic target.]

**Should Sabeena's diabetes become uncontrolled, she may need to initiate another antihyperglycemic agent. Which of the following agents is associated with the highest risk of hypoglycemia?**

- a) Metformin
- b) Thiazolidinedione
- c) SGLT2 inhibitor
- d) DPP-4 inhibitor
- e) Insulin
- f) GLP-1 receptor agonist

[Answer: e. Of these agents, insulin is associated with the highest risk of hypoglycemia. However, for Sabeena, other risks would need to be considered when selecting an appropriate agent. For example, her compromised kidney function would rule out SGLT2 inhibitors and metformin. Risk of hip fractures associated with thiazolidinediones would argue against this class of agents. This example illustrates the multifactorial decisions that must be made when tailoring a diabetes management program.]

Sabeena should schedule a follow-up visit in three months to assess her glycemic control and hypoglycemia.



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This Enduring Material activity, *Managing Type 2 Diabetes in Special Populations: Patient-Centered Treatment to Improve Outcomes (Enduring)*, has been reviewed and is acceptable for up to 2.00 Prescribed credit(s) by the American Academy of Family Physicians. Term of approval begins 06/01/2016. Term of approval is for one year from this date. Physicians should claim only the credit

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# Post-Test Questions

## Managing Type 2 Diabetes in Special Populations: Patient-Centered Treatment to Improve Outcomes

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**1. What is the A<sub>1c</sub> target recommended by the American Diabetes Association for most adults who have type 2 diabetes (with the understanding that this goal may need to be more or less stringent, as determined by the needs of the individual patient)?**

- a) 6.0%                      c) 7.0%                      e) 8.0%
- b) 6.5%                      d) 7.5%                      f) 8.5%

**2. Factors to consider when tailoring a diabetes management plan to an individual patient include:**

- a) glycemic control                      d) cardiovascular considerations
- b) weight gain                              e) patient preferences/concerns
- c) risk of hypoglycemia

**3. Which of the following classes of oral antihyperglycemic agents have been associated with weight gain?**

- a) metformin
- b) sulfonylurea
- c) thiazolidinedione (TZD)
- d) dipeptidyl peptidase-4 (DPP-4) inhibitor
- e) sodium-glucose cotransporter-2 (SGLT2) inhibitor
- f) b and c only
- g) b and e only

**4. As a means to reduce cardiovascular risk, overweight or obese individuals with type 2 diabetes should commence with lifestyle interventions aimed at an initial loss of 5-10% of baseline body weight.**

- a) True                      b) False

**5. Which of the following is NOT a symptom of hypoglycemia?**

- a) hunger                      d) confusion
- b) polyuria                      e) tachycardia/palpitations
- c) dizziness

**6. Which of the following abnormalities are commonly seen in obese individuals?**

- a) insulin resistance                      d) dyslipidemias
- b) type 2 diabetes                      e) all of the above
- c) hypertension

**7. To manage their disease, individuals with type 2 diabetes should receive instruction in which of the following areas?**

- a) diabetes self-management education (DSME)
- b) medical nutrition therapy
- c) physical activity
- d) recognizing symptoms of hypoglycemia
- e) all of the above

**8. When providing care to individuals from different cultural backgrounds, the provider should consider which of the following?**

- a) educational level and health literacy
- b) family integration/support systems
- c) language preferences/English proficiency
- d) spiritual beliefs
- e) knowledge about diabetes
- f) nutritional preferences
- g) all of the above

**9. Intensive therapy regimens (e.g., targeting an A<sub>1c</sub> level below 6.0%) are associated with decreased mortality, significant reductions in cardiovascular events, and lower incidence of hypoglycemia than standard therapy approaches that target an A<sub>1c</sub> level between 7.0% and 7.9%.**

- a) True                      b) False

**10. Which of the following classes of antihyperglycemic agents is associated with the highest risk of hypoglycemia?**

- a) insulin                                      d) sulfonylurea
- b) SGLT-2 inhibitor                      e) metformin
- c) thiazolidinedione

## Program Evaluation

(Rating Scale: 5 is the highest rating; 1 is the lowest rating.)

	5	4	3	2	1
Relevance of this topic to my practice.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinical material was current and useful....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This activity was free of commercial bias...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall rating for this activity.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please state two changes to your practice that you are committed to make based on your experience with this CME Activity.

1. \_\_\_\_\_  
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What barriers could you encounter that could prevent you from implementing these changes?

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