Global Prevalence of Diabetes Expected to Increase by 54% by 2045

2017 U.S. Statistics:
- 1 in 11 Americans has diabetes.
- 1 of every four adults ≥ 65 has diabetes or prediabetes.
- Type 2 diabetes accounts for 90 to 95% of all diabetes cases in the U.S.

Global Statistics:
- 451 million people have diabetes worldwide.
- 2017 U.S. Statistics:
  - 1 in 11 Americans has diabetes.
  - 1 of every four adults ≥ 65 has diabetes or prediabetes.
  - Type 2 diabetes accounts for 90 to 95% of all diabetes cases in the U.S.

Mortality and Morbidity Due to Diabetes
Complications Continue at an Alarming Rate

4 Million Deaths/Year

Opioid Overdose Crisis

In the United States, in 2016, 1 person died every 8 seconds from diabetes and its complications.

Morbidity and Mortality Due to Diabetes
Complications Continue at an Alarming Rate

The Heavy Cost Burden of Diabetes Threatens the Economy

Almost half of all adults with diabetes are between the ages of 45 and 64 years.

OUR VISION
Life free of diabetes and all its burdens.

OUR MISSION
To prevent and cure diabetes and to improve the lives of all people affected by diabetes.
Significant Therapeutic Advances in Diabetes Care Over Past 20 Years


GLP-1R agonist

Insulin

Pramlintide

DPP-4 inhibitor

Bromocriptine

TZD

Metformin

Rapid-acting insulin

Meglitinide

Basal insulin

α-Glucosidase inhibitor

SGLT-2 inhibitor

ADA Standards of Care

1989

Standards of Care

• Funded by ADA's general revenues, without industry support

• Slides correspond with sections within the Standards of Medical Care in Diabetes - 2018.

• Review of scientific literature led by Professional Practice Committee

• PPC recommendations reviewed and approved by ADA's Board of Directors

Professional Practice Committee

Members of the PPC

• Rita R. Kalyani, MD, MHS, FACP (Chair)

• Christopher P. Cannon, MD

• Andrea L. Cherrington, MD, MPH

• Donald R. Coustan, MD

• Ian H. de Boer, MD, MS

• Hope Feldman, CRNP, FNP-BC

• Judith Faulkin, MD

• David Maahs, MD, PhD

• Melinda Marynik, MD, CDE

• Mudith Murad, MD

• Joshua J. Neumiller, PharmD, CDE, FASCP

• Guillermo E. Umpierrez, MD, CDE, FACE, FACP

ADA Staff

• Erika Geibel Berg, PhD

• Matthew P. Peterson

• Sacha Uyemura, RDN, CDE

• William T. Cefalu, MD

ACC Designated Representatives

• Sandeep Das, MD, MPH, FACC

• Mikhail Kosiborod, MD, FACC

Process

• ADA’s Professional Practice Committee (PPC) conducts annual review & revisions.

• Literature search of human studies related to each diabetes subsection and published since January 1 of the previous year.

• Recommendations are revised based on new evidence, for clarity, or to update the text to match the strength of evidence.

Evidence Grading System

Evidence grading: A=Strong, R=Reasonable, C=Conditional

Trend Toward Higher Level of Evidence

Trend from 2005 to 2014 in number and proportion of recommendations made each year in the ADA Standards of Care that were based on higher-level evidence vs. lower-level evidence.
Trend Toward Higher Level of Evidence

Trends from 2005 to 2014 in annual proportion of recommendations based on higher-level evidence, stratified into four mutually exclusive categories

<table>
<thead>
<tr>
<th>Year</th>
<th>Proportion of Recommendations</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>30%</td>
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<tr>
<td>2008</td>
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<td>2009</td>
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<td>2010</td>
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<td></td>
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<tr>
<td>2011</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Standards of Care: Table of Contents

1. Improving Care and Promoting Health in Populations
2. Classification and Diagnosis of Diabetes
3. Comprehensive Medical Evaluation and Assessment of Co-morbidities
4. Lifestyle Management
5. Prevention and Delay of Type 2 Diabetes
6. Glycemic Targets
7. Obesity Management for the Treatment of Type 2 Diabetes
8. Pharmacologic Approaches to Glycemic Treatment
9. Cardiovascular Disease and Risk Management
10. Microvascular Complications and Foot Care
11. Older Adults
12. Children and Adolescents
13. Management of Diabetes in Pregnancy
14. Diabetes Care in the Hospital
15. Diabetes Advocacy

Changes are needed to Improve Care Quality in Diabetes: Type 2 Diabetes Trends in the U.S. 2006-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Proportion of Patients</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>20%</td>
<td></td>
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<tr>
<td>2008</td>
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<td>2009</td>
<td>40%</td>
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<td>2010</td>
<td>50%</td>
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<tr>
<td>2011</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>

Care Delivery Systems

- 33-49% of patients still do not meet targets for A1C, blood pressure, or lipids.
- Only 14% of patients meet targets for all A1C, BP, lipids, and nonsmoking status.
- Progress in CVD risk factor control is slowing.
- Substantial system-level improvements are needed.
- Delivery system is fragmented, lacks clinical information capabilities, duplicates services, and is poorly designed.

Diabetes and Population Health: Recommendations

- Care systems should facilitate team-based care, patient registries, decision support tools, and community involvement to meet patient needs.
- Efforts to assess the quality of diabetes care and create quality improvement strategies should incorporate reliable data metrics, to promote improved processes of care and health outcomes, with simultaneous emphasis on costs.
Health Inequities

- Health inequities related to diabetes and its complications are well documented and are heavily influenced by social determinants of health.
- Social determinants of health are defined as:
  - The economic, environmental, political, and social conditions in which people live.
  - Responsible for a major part of health inequality worldwide.

Tailoring Treatment for Social Context

Key Recommendations:
- Providers should assess social context, including potential food insecurity, housing stability, and financial barriers, and apply that information to treatment decisions. A
- Refer patients to local community resources when available. B
- Provide patients with self-management support from lay health coaches, navigators, or community health workers when available. A

Classification and Diagnosis of Diabetes

1. Type 1 diabetes
   - β-cell destruction
2. Type 2 diabetes
   - Progressive insulin secretory defect
3. Gestational Diabetes Mellitus (GDM)
4. Other specific types of diabetes due to other causes:
   - Monogenic diabetes syndromes
   - Diseases of the exocrine pancreas, e.g., cystic fibrosis
   - Drug- or chemical-induced diabetes

Criteria for the Diagnosis of Diabetes

<table>
<thead>
<tr>
<th>Table 2.2—Criteria for the diagnosis of diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h. *</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>2-h PG ≥200 mg/dL (11.1 mmol/L) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water. *</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>A1C ≥6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay. *</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L). *</td>
</tr>
</tbody>
</table>

*In the absence of unequivocal hyperglycemia, results should be confirmed by repeat testing.

Categories of Increased Risk for Diabetes (Prediabetes)

<table>
<thead>
<tr>
<th>Table 2.4—Categories of increased risk for diabetes (prediabetes)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L) (IFG)</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>2-h PG during 75 g OGTT 140 mg/dL (7.8 mmol/L) to 190 mg/dL (10.9 mmol/L) (IGT)</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>A1C 5.7%–6.4% (39–47 mmol/mol)</td>
</tr>
</tbody>
</table>

*For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range.
A1C: New Recommendations

• To avoid misdiagnosis or missed diagnosis, the A1C test should be performed using a method that is certified by the NGSP and standardized to the Diabetes Control and Complications Trial (DCCT) assay.

• Marked discordance between measured A1C and plasma glucose levels should raise the possibility of A1C assay interference due to hemoglobin variants (i.e., hemoglobinopathies) and consideration of using an assay without interference or plasma blood glucose criteria to diagnose diabetes.

• In conditions associated with increased red blood cell turnover, such as sickle cell disease, pregnancy (second and third trimesters), hemolytic anemia, recent blood loss or transfusion, or erythropoietin therapy, only plasma blood glucose criteria should be used to diagnose diabetes.

Testing for Diabetes or Prediabetes in Asymptomatic Adults

Table 2.3—Criteria for testing for diabetes or prediabetes in asymptomatic adults

1. Testing should be considered in overweight or obese (BMI ≥ 25 kg/m²) or type 2 diabetes mellitus (T2DM) or prediabetes
2. Family history of diabetes (i.e., male or female first-degree relative with diabetes, high-risk race or ethnicity [e.g., African American, Latin American, Native American, Asian American, Pacific Islander]
3. A1C (HbA1c) ≤ 6.5% (i.e., 53 mmol/mol and <57 mmol/mol), and/or a fasting plasma glucose level >126 mg/dL (7.0 mmol/L) or non-fasting plasma glucose level >200 mg/dL (11.1 mmol/L)
4. History of polycystic ovary syndrome
5. Physical inactivity
6. Other chronic conditions associated with insulin resistance (e.g., severe obesity, anorexia nervosa)

Patient-Centered Collaborative Care

• A patient-centered communication style that uses person-centered and strength-based language, active listening, elicits patient preferences and beliefs, and assesses literacy, numeracy, and potential barriers to care should be used to optimize patient health outcomes and health-related quality of life.
Components of the Comprehensive Diabetes Evaluation

**Comprehensive Medical Evaluation and Assessment of Comorbidities:** Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018; 41 (Suppl. 1): S28-S37

### Laboratory Evaluation

- Complete blood count
- Basic metabolic panel
- Lipid profile
- Gab-ALS test
- Serum creatinine and estimated glomerular filtration rate
- Urine or serum uric acid
- Urinary microalbumin or albumin-to-creatinine ratio

### Physical Examination

- Height, weight, and BMI
- Growth and development tracking
- Cardiovascular examination
- Respiratory examination
- Skin examination
- Comprehensive foot examination

## Components of the Comprehensive Diabetes Evaluation

### 4. Lifestyle Management

- Diabetes self-management education and support (DSMES)
- Medical nutrition therapy (MNT)
- Physical activity
- Smoking cessation counseling
- Psychosocial care

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† May be needed more frequently in patients with known chronic kidney disease or with changes in medications that affect kidney function and serum potassium.

# May also need to be checked after initiation or dose changes of medications that affect these laboratory values (i.e., diabetes medications, blood pressure medications, cholesterol medications, or thyroid medications).

˄ In people without dyslipidemia and not on cholesterol-lowering therapy, testing may be less frequent.
Diabetes Self-Management Education and Support

Four critical time points for DSMES delivery:
1. At diagnosis
2. Annually for assessment of education, nutrition, and emotional needs
3. When new complicating factors (health conditions, physical limitations, emotional factors, or basic living needs) arise that influence self-management; and
4. When transitions in care occur

Lifestyle Management: Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018; 41 (Suppl. 1): S38-S50

Nutrition: Recommendations

<table>
<thead>
<tr>
<th>Type</th>
<th>Recommendations</th>
<th>Evidence rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>• • • •</td>
<td>• An individual MNT program, periodically provided by a registered dietician, is recommended for all people with type 1 or type 2 diabetes or prediabetes diabetes mellitus.</td>
<td>A</td>
</tr>
<tr>
<td>• • • •</td>
<td>• A simple and effective approach to glycemic and weight management emphasizing portion control and healthy food choices may be considered for those with type 2 diabetes and/or not taking insulin who have limited health literacy and are unprepared or unable to follow an intensive treatment program.</td>
<td>B</td>
</tr>
<tr>
<td>• • • •</td>
<td>• Frequent diabetes nutritional therapy may result in sustained weight loss and improved outcomes (A, A, A, A). Weight loss in the population may be associated with improved glycemic control and other cardiovascular risk factors.</td>
<td>A</td>
</tr>
</tbody>
</table>

Energy balance

• • • • | • Weight loss (15%) achieved by the combination of reduction of caloric intake and lifestyle modification benefits overweight or obese adults with type 2 diabetes and also those with prediabetes. Intervention programs to facilitate long-term weight loss and maintenance should be individualized while keeping risk factors and metabolic goals in mind. | C |

Eating patterns and macronutrient distribution

• • • • | • There is a single clear dietary intervention (use of alternating carbohydrate, fat, and protein) that is effective for patients, children, and individuals with diabetes. Interventions should be individualized while keeping risk factors in mind. | C |

Physical Activity: Recommendations

• Children and adolescents with 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.

• Most adults with type 1 and type 2 diabetes should engage in 150 min or more of moderate-to-vigorous intensity aerobic activity per week, spread over at least 5 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.

Lifestyle Management: Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018; 41 (Suppl. 1): S38-S50

Diabetes Food Hub

• Diabetes Food Hub allows users to customize recipes to meet individual needs:
  • adjust the number of servings to make or the portion to eat, and
  • nutrition facts and ingredient lists are recalculated based on the servings and portions chosen.

Diabetes Distress

• Diabetes distress
  • Very common and distinct from other psychological disorders
  • Negative psychological reactions related to emotional burdens of managing a demanding chronic disease

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

Mental Health Provider Diabetes Education Program (MHDEP)

ADA and the American Psychological Association (APA) partnered to create the first ever, diabetes-focused continuing education (CE) program for licensed mental health providers.

Upon successful completion of the program, the provider can:
• Become an ADA member at the Associate level
• Receive IX CE credits from the APA
• Become eligible for inclusion on the Mental Health Provider Referral Directory
• Access the ADA’s new listserve for behavioral health and psychosocial topics
• Access monthly ‘mentoring’ calls with experts in the field
5. Prevention or Delay of Type 2 Diabetes

Prevention or Delay of T2DM: Recommendations

• Patients with prediabetes should be referred to an intensive behavioral lifestyle intervention program modeled on the Diabetes Prevention Program to achieve and maintain 7% loss of initial body weight and increase moderate-intensity physical activity (such as brisk walking) to at least 150 min/week. A

• Metformin therapy for prevention of type 2 diabetes should be considered in those with prediabetes, especially for those with BMI ≥35 kg/m², those aged <60 years, and women with prior GDM. A

6. Glycemic Targets

Summary of Glycemic Recommendations

Table 6.2: Summary of glycemic recommendations for many nonpregnant adults with diabetes

<table>
<thead>
<tr>
<th>A1C</th>
<th>&quot;≤7.0% (53 mmol/mol)*</th>
<th>Preprandial capillary plasma glucose</th>
<th>≤70-130 mg/dL (≥4.4-7.3 mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak postprandial capillary plasma glucose</td>
<td>≤180 mg/dL (≤10.0 mmol/L)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Moderate or less stringent glycemic goals may be appropriate for individual patients. Goals should be individualized based on duration of diabetes, age/sex, race/ethnicity, comorbid conditions, known CVD or other microvascular complications, hypoglycemia unawareness, and individual patient considerations. Postprandial glucose measurements should be made 1-2 h after the beginning of the meal, generally peak levels in patients with diabetes.

7. Obesity Management for the Treatment of Type 2 Diabetes

Published new algorithm for the treatment of T2D, as recommended by DSS-II voting delegates.
Algorithm for the Treatment of T2D

Overweight/Obesity Treatment Options in T2DM

Management Approach for Hyperglycemia

Pharmacologic Therapy For Type 1 Diabetes: Recommendations

Mortality and Cardiovascular Disease in Type 1 and Type 2 Diabetes
In patients with T2DM and established ASCVD, antihyperglycemic therapy should begin with lifestyle management and metformin and subsequently incorporate an agent proven to reduce major adverse CV events and CV mortality (currently empagliflozin and liraglutide), after considering drug-specific and patient factors (Table 8.1). A

In patients with T2DM and established ASCVD, after lifestyle management and metformin, the antihyperglycemic agent canagliflozin may be considered to reduce major adverse CV events, based on drug-specific and patient factors (Table 8.1). C
Doctors prescribe medicine of which they know little, to cure diseases of which they know less, in human beings of which they know nothing.

Francois-Marie Voltaire, 250 years ago

9. Cardiovascular Disease and Risk Management

Diabetes and Cardiovascular Disease

- ASCVD is the leading cause of morbidity & mortality for those with diabetes.
- Largest contributor to direct/indirect costs
- Common conditions coexisting with type 2 diabetes (e.g., hypertension, dyslipidemia) are clear risk factors for ASCVD.
- Diabetes itself confers independent risk
- Control individual cardiovascular risk factors to prevent/slow CVD in people with diabetes.
- Systematically assess all patients with diabetes for cardiovascular risk factors.
10. Microvascular Complications and Foot Care

Diabetic Retinopathy: Recommendations

Treatment:
- The traditional standard treatment, panretinal laser photocoagulation therapy, is indicated to reduce the risk of vision loss in patients with high-risk PDR and, in some cases, severe NPDR. A
- Intravitreous injections of anti-vascular endothelial growth factor ranibizumab are not inferior to traditional panretinal laser photocoagulation and are also indicated to reduce the risk of vision loss in patients with PDR. A

Older Adults: Recommendations

Pharmacologic Therapy:
- In older adults at increased risk of hypoglycemia, medication classes with low risk of hypoglycemia are preferred. B
- Overtreatment of diabetes is common in older adults and should be avoided. B
- Deintensification (or simplification) of complex regimens is recommended to reduce the risk of hypoglycemia, if it can be achieved within the individualized A1C target. B
12. Children and Adolescents

Type 2 Diabetes in Youth

- T2DM in youth has increased over the past 20 years
  - ~5,000 new cases per year in the U.S.
- T2DM in youth is different from both T1DM in youth and T2DM in adults
- Disproportionately impacts youth of ethnic and racial minorities
- Additional risk factors include:
  - Adiposity, family history of diabetes, female sex, and low socioeconomic status

Risk-Based Screening in Asymptomatic Children and Adolescents

<table>
<thead>
<tr>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight (BMI ≥ 95th percentile for age and sex, weight for height ≥ 150% of ideal for height)</td>
</tr>
<tr>
<td>Plus one or more additional risk factors based on the strength of their association with diabetes as indicated by evidence grades:</td>
</tr>
<tr>
<td>• Maternal history of diabetes or GDM during the child’s gestation A</td>
</tr>
<tr>
<td>• Family history of type 2 diabetes in first- or second-degree relative A</td>
</tr>
<tr>
<td>• Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander) A</td>
</tr>
<tr>
<td>• Signs of insulin resistance or conditions associated with insulin resistance (polycystic ovary syndrome, obesity)</td>
</tr>
</tbody>
</table>

Table 2.5—Risk-based screening for type 2 diabetes or prediabetes in asymptomatic children and adolescents in a clinical setting

Living Standards of Care

- Provides all of ADA’s current clinical practice recommendations
  - The Standards supersedes all previous position statements on clinical topics within the purview of the Standards
- Annual review process remains the same, but mid-year updates become “Event-Driven”
  - Option to update the Standards mid-year should the PPC determine that new evidence or regulatory changes merit immediate incorporation
  - Updates may be suggested by PPC members, ADA staff, or members of the diabetes community
  - Updates must be reviewed and approved by the PPC
General Process Changes

- SOC are now the sole source of ADA’s clinical practice recommendations.
- The PPC will continue to update the Standards annually, and now has the option to update throughout the year, online, if the PPC determines that new evidence or regulatory changes merit immediate updates or inclusion.
- ADA will begin taking proposals from the community for statements, consensus reports, scientific reviews, and clinical/research conferences.

Examples of Evidence-Based Updates:
- FDA makes a decision to approve metformin for prevention in people with prediabetes.
- Approval, clinical use and new indications of technology and devices.
- New drug approval or new indication: ertugliflozin and semaglutide.

Living Standards of Care

Examples of Evidence-Based Updates:
- FDA makes a decision to approve metformin for prevention in people with prediabetes.
- Approval, clinical use and new indications of technology and devices.
- New drug approval or new indication: ertugliflozin and semaglutide.

Taxonomy of ADA Documents & Conferences

- ADA Statements: represent the official ADA position and are in line with the Standards of Care.
- The following do not represent the official ADA position and are not tied to the SOC:
  - Expert Consensus Reports
  - Scientific Reviews
  - Evolving Clinical Concepts Conferences
  - Research Symposia
  - Conference Proceedings

Standards of Care Scope and Impact

2018 Standards of Care: Resources

- Full version available
- Abridged version for PCPs
- Free app (launching Spring 2018)
- Pocket cards with key figures
- Free webcast for continuing education credit
Professional Education

- Live programs
- Online self-assessment programs
- Online webcasts

[professional.diabetes.org/CE](http://professional.diabetes.org/CE)

Diabetes Self-Management Education

- Find a recognized Diabetes Self-Management program
- Become a recognized DSME program
- Tools and resources for DSME programs
- Online education documentation tools

[professional.diabetes.org/ERP](http://professional.diabetes.org/ERP)

Professional Membership

- Journals
- Meeting, book and journal discounts
- Career center
- Quarterly member newsletter

[professional.diabetes.org/Membership](http://professional.diabetes.org/Membership)

Thank you.