American Association of Clinical Endocrinologists and American College of Endocrinology
Clinical Practice Guidelines for Developing a Diabetes Mellitus Comprehensive Care Plan

Writing Committee Cochairpersons
Yehuda Handelsman MD, FACP, FACE, FNLA
Zachary T. Bloomgarden, MD, MACE
George Grunberger, MD, FACP, FACE
Guillermo Umpierrez, MD, FACP, FACE
Robert S. Zimmerman, MD, FACE

ENDOCRINE PRACTICE Vol 21 No. 4 April 2015
AACE Clinical Practice Guidelines for Diabetes Mellitus Writing Committee Task Force

Timothy S. Bailey, MD, FACP, FACE, ECNU
Lawrence Blonde MD, FACP, FACE
George A. Bray, MD, MACP, MACE
A. Jay Cohen MD, FACE, FAAP
Samuel Dagogo-Jack, MD, DM, FRCP, FACE
Jaime A. Davidson, MD, FACP, MACE
Daniel Einhorn, MD, FACP, FACE
Om P. Ganda, MD, FACE
Alan J. Garber, MD, PhD, FACE
W. Timothy Garvey, MD
Robert R. Henry, MD
Irl B. Hirsch, MD
Edward S. Horton, MD, FACP, FACE
Daniel L. Hurley, MD, FACE
Paul S. Jellinger, MD, MACE
Lois Jovanović, MD, MACE
Harold E. Lebovitz, MD, FACE
Derek LeRoith, MD, PhD, FACE
Philip Levy, MD, MACE
Janet B. McGill, MD, MA, FACE
Jeffrey I. Mechanick, MD, FACP, FACE, FACN, ECNU
Jorge H. Mestman, MD
Etie S. Moghissi, MD, FACP, FACE
Eric A. Orzech, MD, FACP, FACE
Paul D. Rosenblit, MD, PhD, FACE, FNLA
Aaron I. Vinik, MD, PhD, FCP, MACP, FACE
Kathleen Wyne, MD, PhD, FNLA, FACE
Farhad Zangeneh, MD, FACP, FACE

Reviewers
Lawrence Blonde MD, FACP, FACE
Alan J. Garber, MD, PhD, FACE
AACE DM CPG Objectives and Structure

- This CPG aims to provide the following:
  - An evidence-based education resource for the development of a diabetes comprehensive care plan
  - Easy-to-follow structure
    - 24 diabetes management questions
    - 67 practical recommendations
  - Concise, practical format that complements existing DM textbooks
  - A document suitable for electronic implementation to assist with clinical decision-making for patients with DM
## AACE DM CPG

### Evidence Ratings and Grades

<table>
<thead>
<tr>
<th>Evidence level</th>
<th>Evidence grade</th>
<th>Semantic descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Meta-analysis of randomized controlled trials (MRCT)</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>Randomized controlled trials (RCT)</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Meta-analysis of nonrandomized prospective or case-controlled trials (MNRCT)</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Nonrandomized controlled trial (NRCT)</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Prospective cohort study (PCS)</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Retrospective case-control study (RCCS)</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Cross-sectional study (CSS)</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Surveillance study (registries, surveys, epidemiologic study, retrospective chart review, mathematical modeling of database) (SS)</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Consecutive case series (CCS)</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Single case reports (SCR)</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>No evidence (theory, opinion, consensus, review, or preclinical study) (NE)</td>
</tr>
</tbody>
</table>
AACE DM CPG Questions

1. How is diabetes screened and diagnosed?
2. How is prediabetes managed?
3. What are glycemic treatment goals of DM?
4. How are glycemic targets achieved for T2D?
5. How should glycemia in T1D be managed?
6. How is hypoglycemia managed?
7. How is hypertension managed in patients with diabetes?
8. How is dyslipidemia managed in patients with diabetes?
9. How is nephropathy managed in patients with diabetes?
10. How is retinopathy managed in patients with diabetes?
11. How is neuropathy diagnosed and managed in patients with diabetes?
12. How is CVD managed in patients with diabetes?
13. How is obesity managed in patients with diabetes?

Continued on next slide
AACE DM CPG Questions

14. What is the role of sleep medicine in the care of the patient with diabetes?
15. How is diabetes managed in the hospital?
16. How is a comprehensive diabetes care plan established in children and adolescents?
17. How should diabetes in pregnancy be managed?
18. When and how should glucose monitoring be used?
19. When and how should insulin pump therapy be used?
20. What is the imperative for education and team approach in DM management?
21. What vaccinations should be given to patients with diabetes?
22. How should depression be managed in the context of diabetes?
23. What is the association between diabetes and cancer?
24. Which occupations have specific diabetes management requirements?
Q1. How is diabetes screened and diagnosed?

Criteria for Screening for T2D and Prediabetes in Asymptomatic Adults

- Age ≥45 years without other risk factors
- Family history of T2D
- CVD
- Overweight
  - BMI ≥30 kg/m²
  - BMI 25-29.9 kg/m² plus other risk factors*
- Sedentary lifestyle
- Member of an at-risk racial or ethnic group: Asian, African American, Hispanic, Native American, and Pacific Islander
- Dyslipidemia
  - HDL-C <35 mg/dL
  - Triglycerides >250 mg/dL
- IGT, IFG, and/or metabolic syndrome
- PCOS, acanthosis nigricans, NAFLD
- Hypertension (BP >140/90 mm Hg or therapy for hypertension)
- History of gestational diabetes or delivery of a baby weighing more than 4 kg (9 lb)
- Antipsychotic therapy for schizophrenia and/or severe bipolar disease
- Chronic glucocorticoid exposure
- Sleep disorders† in the presence of glucose intolerance

- Screen at-risk individuals with glucose values in the normal range every 3 years
- Consider annual screening for patients with 2 or more risk factors

*At-risk BMI may be lower in some ethnic groups; consider using waist circumference.
†Obstructive sleep apnea, chronic sleep deprivation, and night shift occupations.

BMI = body mass index; BP = blood pressure; CVD = cardiovascular disease; HDL-C = high density lipoprotein cholesterol; IFG = impaired fasting glucose; IGT = impaired glucose tolerance; NAFLD = nonalcoholic fatty liver disease; PCOS = polycystic ovary syndrome; T2D, type 2 diabetes.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
Q1. How is diabetes screened and diagnosed?

Diagnostic Criteria for Prediabetes and Diabetes in Nonpregnant Adults

<table>
<thead>
<tr>
<th>Normal</th>
<th>High Risk for Diabetes</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG &lt;100 mg/dL</td>
<td>IFG FPG ≥100-125 mg/dL</td>
<td>FPG ≥126 mg/dL</td>
</tr>
<tr>
<td>2-h PG &lt;140 mg/dL</td>
<td>IGT 2-h PG ≥140-199 mg/dL</td>
<td>2-h PG ≥200 mg/dL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Random PG ≥200 mg/dL + symptoms*</td>
</tr>
<tr>
<td>A1C &lt;5.5%</td>
<td>5.5 to 6.4%</td>
<td>≥6.5%</td>
</tr>
<tr>
<td></td>
<td>For screening of prediabetes†</td>
<td>Secondary‡</td>
</tr>
</tbody>
</table>

*Polydipsia (frequent thirst), polyuria (frequent urination), polyphagia (extreme hunger), blurred vision, weakness, unexplained weight loss.

†A1C should be used only for screening prediabetes. The diagnosis of prediabetes, which may manifest as either IFG or IGT, should be confirmed with glucose testing.

‡Glucose criteria are preferred for the diagnosis of DM. In all cases, the diagnosis should be confirmed on a separate day by repeating the glucose or A1C testing. When A1C is used for diagnosis, follow-up glucose testing should be done when possible to help manage DM.

FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; PG, plasma glucose.
### Diagnostic Criteria for Gestational Diabetes

<table>
<thead>
<tr>
<th>Test</th>
<th>Screen at 24-28 weeks gestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG, mg/dL</td>
<td>&gt;92</td>
</tr>
<tr>
<td>1-h PG*, mg/dL</td>
<td>≥180</td>
</tr>
<tr>
<td>2-h PG*, mg/dL</td>
<td>≥153</td>
</tr>
</tbody>
</table>

*Measured with an OGTT performed 2 hours after 75-g oral glucose load.

FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; PG, plasma glucose.
AACE Recommendations for A1C Testing

- A1C should be considered an additional optional diagnostic criterion, not the primary criterion for diagnosis of diabetes
- When feasible, AACE/ACE suggest using traditional glucose criteria for diagnosis of diabetes
- A1C is not recommended for diagnosing type 1 diabetes
- A1C is not recommended for diagnosing gestational diabetes
Q1. How is diabetes screened and diagnosed?

AACE Recommendations for A1C Testing

- A1C levels may be misleading in several ethnic populations (for example, African Americans)
- A1C may be misleading in some clinical settings
  - Hemoglobinopathies
  - Iron deficiency
  - Hemolytic anemias
  - Thalassemias
  - Spherocytosis
  - Severe hepatic or renal disease
- AACE/ACE endorse the use of only standardized, validated assays for A1C testing
Diagnosing Type 1 Diabetes (T1D)

- Usually characterized by insulin deficiency and dependency
  - Document levels of insulin and C-peptide
- Test for autoantibodies*
  - Insulin
  - Glutamic acid decarboxylase
  - Pancreatic islet β cells (tyrosine phosphatase IA-2)
  - Zinc transporter (ZnT8)
- May occur in overweight or obese as well as lean individuals

*Evidence of autoimmunity may be absent in idiopathic T1D.
Q2. How is prediabetes managed?

**T2D Incidence in the DPP**

- **Intensive lifestyle intervention** *(n=1079)*: 4.8 per 100 person-years, 58% reduction.
- **Metformin 850 mg BID** *(n=1073)*: 7.8 per 100 person-years, 31% reduction.
- **Placebo** *(n=1082)*: 11 per 100 person-years.

*Goal: 7% reduction in baseline body weight through low-calorie, low-fat diet and ≥150 min/week moderate intensity exercise.*

DPP, Diabetes Prevention Program; IGT, impaired glucose tolerance; T2D, type 2 diabetes.


Copyright © 2015 AACE. May not be reprinted in any form without express written permission from AACE.
Medical and Surgical Interventions Shown to Delay or Prevent T2D

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Follow-up Period</th>
<th>Reduction in Risk of T2D (P value vs placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antihyperglycemic agents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin¹</td>
<td>2.8 years</td>
<td>31% (P&lt;0.001)</td>
</tr>
<tr>
<td>Acarbose²</td>
<td>3.3 years</td>
<td>25% (P=0.0015)</td>
</tr>
<tr>
<td>Pioglitazone³</td>
<td>2.4 years</td>
<td>72% (P&lt;0.001)</td>
</tr>
<tr>
<td>Rosiglitazone⁴</td>
<td>3.0 years</td>
<td>60% (P&lt;0.0001)</td>
</tr>
<tr>
<td><strong>Weight loss interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orlistat⁵</td>
<td>4 years</td>
<td>37% (P=0.0032)</td>
</tr>
<tr>
<td>Phentermine/topiramate⁶</td>
<td>2 years</td>
<td>79% (P&lt;0.05)</td>
</tr>
<tr>
<td>Bariatric surgery⁷</td>
<td>10 years</td>
<td>75% (P&lt;0.001)</td>
</tr>
</tbody>
</table>

**Lifestyle modification should be used with all pharmacologic or surgical interventions.**

T2D, type 2 diabetes.


Copyright © 2015 AACE.

May not be reprinted in any form without express written permission from AACE.
PREDIABETES ALGORITHM

IFG (100–125) | IGT (140–199) | METABOLIC SYNDROME (NCEP 2005)

LIFESTYLE MODIFICATION
(Including Medically Assisted Weight Loss)

OTHER CVD RISK FACTORS

WEIGHT LOSS THERAPIES

ANTIHYPERTENSIVE THERAPIES
FPG > 100 | 2-hour PG > 140

CVD RISK FACTOR MODIFICATIONS ALGORITHM

NORMAL GLYCEMIA

Progression

PROCEED TO HYPERGLYCEMIA ALGORITHM

OVERT DIABETES

1 PRE-DM CRITERION

MULTIPLE PRE-DM CRITERIA

Intensify Weight Loss Therapies
Low-risk Medications
Metformin
Acarbose
Consider with Caution
TZD
GLP-1 RA

If glycemia not normalized, consider with caution

COPYRIGHT © 2015 AACE MAY NOT BE REPRODUCED IN ANY FORM WITHOUT EXPRESS WRITTEN PERMISSION FROM AACE.
### Outpatient Glucose Targets for Nonpregnant Adults

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment Goal</th>
</tr>
</thead>
</table>
| A1C, %             | Individualize on the basis of age, comorbidities, duration of disease, and hypoglycemia risk:  
|                    | • In general, ≤6.5 for most*  
|                    | • Closer to normal for healthy  
|                    | • Less stringent for “less healthy”  |
| FPG, mg/dL         | <110                                                                           |
| 2-Hour PPG, mg/dL  | <140                                                                           |

*Provided target can be safely achieved.

FPG = fasting plasma glucose; PPG = postprandial glucose.
## Outpatient Glucose Targets for Pregnant Women

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gestational diabetes mellitus (GDM)</strong></td>
<td></td>
</tr>
<tr>
<td>Preprandial glucose, mg/dL</td>
<td>≤95*</td>
</tr>
<tr>
<td>1-Hour PPG, mg/dL</td>
<td>≤140*</td>
</tr>
<tr>
<td>2-Hour PPG, mg/dL</td>
<td>≤120*</td>
</tr>
<tr>
<td><strong>Preexisting T1D or T2D</strong></td>
<td></td>
</tr>
<tr>
<td>Premeal, bedtime, and overnight glucose, mg/dL</td>
<td>60-99*</td>
</tr>
<tr>
<td>Peak PPG, mg/dL</td>
<td>100-129*</td>
</tr>
<tr>
<td>A1C</td>
<td>≤6.0%*</td>
</tr>
</tbody>
</table>

*Provided target can be safely achieved.

FPG = fasting plasma glucose; PPG = postprandial glucose.
Inpatient Glucose Targets for Nonpregnant Adults

<table>
<thead>
<tr>
<th>Hospital Unit</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensive/critical care</strong></td>
<td></td>
</tr>
<tr>
<td>Glucose range, mg/dL</td>
<td>140-180*</td>
</tr>
<tr>
<td><strong>General medicine and surgery, non-ICU</strong></td>
<td></td>
</tr>
<tr>
<td>Premeal glucose, mg/dL</td>
<td>&lt;140*</td>
</tr>
<tr>
<td>Random glucose, mg/dL</td>
<td>&lt;180*</td>
</tr>
</tbody>
</table>

*Provided target can be safely achieved.

ICU = intensive care unit.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
## Therapeutic Lifestyle Changes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss (for overweight and obese patients)</td>
<td>Reduce by 5% to 10%</td>
</tr>
<tr>
<td>Physical activity</td>
<td>150 min/week of moderate-intensity exercise (eg, brisk walking) plus flexibility and strength training</td>
</tr>
<tr>
<td>Diet</td>
<td>• Eat regular meals and snacks; avoid fasting to lose weight</td>
</tr>
<tr>
<td></td>
<td>• Consume plant-based diet (high in fiber, low calories/glycemic index, and high in phytochemicals/antioxidants)</td>
</tr>
<tr>
<td></td>
<td>• Understand Nutrition Facts Label information</td>
</tr>
<tr>
<td></td>
<td>• Incorporate beliefs and culture into discussions</td>
</tr>
<tr>
<td></td>
<td>• Use mild cooking techniques instead of high-heat cooking</td>
</tr>
<tr>
<td></td>
<td>• Keep physician-patient discussions informal</td>
</tr>
</tbody>
</table>
### Q4. How are glycemic targets achieved for T2D?

#### Healthful Eating Recommendations

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| Carbohydrate | Specify healthful carbohydrates (fresh fruits and vegetables, legumes, whole grains); target 7-10 servings per day  
Preferentially consume lower-glycemic index foods (glycemic index score <55 out of 100: multigrain bread, pumpernickel bread, whole oats, legumes, apple, lentils, chickpeas, mango, yams, brown rice) |
| Fat         | Specify healthful fats (low mercury/contaminant-containing nuts, avocado, certain plant oils, fish)  
Limit saturated fats (butter, fatty red meats, tropical plant oils, fast foods) and trans fat; choose fat-free or low-fat dairy products |
| Protein     | Consume protein in foods with low saturated fats (fish, egg whites, beans); there is no need to avoid animal protein  
Avoid or limit processed meats |
| Micronutrients | Routine supplementation is not necessary; a healthful eating meal plan can generally provide sufficient micronutrients  
Chromium; vanadium; magnesium; vitamins A, C, and E; and CoQ10 are not recommended for glycemic control  
Vitamin supplements should be recommended to patients at risk of insufficiency or deficiency |
### Healthful Eating Recommendations

| Carbohydrate | Specify healthful carbohydrates (fresh fruits and vegetables, legumes, whole grains); target 7-10 servings per day. Preferentially consume lower-glycemic index foods (glycemic index score <55 out of 100: multigrain bread, pumpernickel bread, whole oats, legumes, apple, lentils, chickpeas, mango, yams, brown rice). |
| Fat | Specify healthful fats (low mercury/contaminant-containing nuts, avocado, certain plant oils, fish). Limit saturated fats (butter, fatty red meats, tropical plant oils, fast foods) and trans fat; choose fat-free or low-fat dairy products. |
| Protein | Consume protein in foods with low saturated fats (fish, egg whites, beans); there is no need to avoid animal protein. Avoid or limit processed meats. |
| Micronutrients | Routine supplementation is not necessary; a healthful eating meal plan can generally provide sufficient micronutrients. Chromium; vanadium; magnesium; vitamins A, C, and E; and CoQ10 are not recommended for glycemic control. Vitamin supplements should be recommended to patients at risk of insufficiency or deficiency. |
### Noninsulin Agents Available for T2D

<table>
<thead>
<tr>
<th>Class</th>
<th>Primary Mechanism of Action</th>
<th>Agent(s)</th>
<th>Available as</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-Glucosidase inhibitors</td>
<td>• Delay carbohydrate absorption from intestine</td>
<td>Acarbose Miglitol</td>
<td>Precose or generic Glyset</td>
</tr>
<tr>
<td>Amylin analogue</td>
<td>• Decrease glucagon secretion • Slow gastric emptying • Increase satiety</td>
<td>Pramlintide</td>
<td>Symlin</td>
</tr>
<tr>
<td>Biguanide</td>
<td>• Decrease HGP • Increase glucose uptake in muscle</td>
<td>Metformin</td>
<td>Glucophage or generic</td>
</tr>
<tr>
<td>Bile acid sequestrant</td>
<td>• Decrease HGP? • Increase incretin levels?</td>
<td>Colesevelam</td>
<td>WelChol</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>• Increase glucose-dependent insulin secretion • Decrease glucagon secretion</td>
<td>Alogliptin Linagliptin</td>
<td>Nesina</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saxagliptin Sitagliptin</td>
<td>Tradjenta Onglyza Januvia</td>
</tr>
<tr>
<td>Dopamine-2 agonist</td>
<td>• Activates dopaminergic receptors</td>
<td>Bromocriptine</td>
<td>Cycloset</td>
</tr>
<tr>
<td>Glinides</td>
<td>• Increase insulin secretion</td>
<td>Nateglinide Repaglinide</td>
<td>Starlix or generic Prandin</td>
</tr>
</tbody>
</table>

DPP-4 = dipeptidyl peptidase; HGP = hepatic glucose production.


Continued on next slide
## Noninsulin Agents Available for T2D

<table>
<thead>
<tr>
<th>Class</th>
<th>Primary Mechanism of Action</th>
<th>Agent(s)</th>
<th>Available as</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLP-1 receptor agonists</strong></td>
<td>• Increase glucose-dependent insulin secretion</td>
<td>Albiglutide</td>
<td>Tanzeum</td>
</tr>
<tr>
<td></td>
<td>• Decrease glucagon secretion</td>
<td>Dulaglutide</td>
<td>Trulicity</td>
</tr>
<tr>
<td></td>
<td>• Slow gastric emptying</td>
<td>Exenatide</td>
<td>Byetta</td>
</tr>
<tr>
<td></td>
<td>• Increase satiety</td>
<td>Exenatide XR</td>
<td>Bydureon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liraglutide</td>
<td>Victoza</td>
</tr>
<tr>
<td><strong>SGLT2 inhibitors</strong></td>
<td>• Increase urinary excretion of glucose</td>
<td>Canagliflozin</td>
<td>Invokana</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dapagliflozin</td>
<td>Farxiga</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empagliflozin</td>
<td>Jardiance</td>
</tr>
<tr>
<td><strong>Sulfonylureas</strong></td>
<td>• Increase insulin secretion</td>
<td>Glimepiride</td>
<td>Amaryl or generic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glipizide</td>
<td>Glucotrol or generic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glyburide</td>
<td>Diaβeta, Glynase, Micronase,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or generic</td>
</tr>
<tr>
<td><strong>Thiazolidinediones</strong></td>
<td>• Increase glucose uptake in muscle and fat</td>
<td>Pioglitazone</td>
<td>Actos</td>
</tr>
<tr>
<td></td>
<td>• Decrease HGP</td>
<td>Rosiglitazone</td>
<td>Avandia</td>
</tr>
</tbody>
</table>

GLP-1 = glucagon-like peptide; HGP = hepatic glucose production; SGLT2 = sodium glucose cotransporter 2.


Copyright © 2015 AACE. May not be reprinted in any form without express written permission from AACE.
### Q4. How are glycemic targets achieved for T2D?

#### Effects of Agents Available for T2D

<table>
<thead>
<tr>
<th>FPG lowering</th>
<th>Met</th>
<th>GLP1RA</th>
<th>SGLT2I</th>
<th>DPP4I</th>
<th>TZD</th>
<th>AGI</th>
<th>Coles</th>
<th>BCR-QR</th>
<th>SU/Glinide</th>
<th>Insulin</th>
<th>Pram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod</td>
<td>Mild</td>
<td>Mild to mod*</td>
<td>Mod</td>
<td>Mild</td>
<td>Mod</td>
<td>Neutral</td>
<td>Mild</td>
<td>Neutral</td>
<td>SU: mod Glinide: mild</td>
<td>Mod to marked (basal insulin or premixed)</td>
<td>Mild</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PPG lowering</th>
<th>Met</th>
<th>GLP1RA</th>
<th>SGLT2I</th>
<th>DPP4I</th>
<th>TZD</th>
<th>AGI</th>
<th>Coles</th>
<th>BCR-QR</th>
<th>SU/Glinide</th>
<th>Insulin</th>
<th>Pram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Mod to marked</td>
<td>Mild</td>
<td>Mod</td>
<td>Mild</td>
<td>Mod</td>
<td>Mild</td>
<td>Mild</td>
<td>Mod</td>
<td>Mod to marked (short/rapid-acting insulin or premixed)</td>
<td>Mod to marked</td>
<td></td>
</tr>
</tbody>
</table>

*AGI = α-glucosidase inhibitors; BCR-QR = bromocriptine quick release; Coles = colesevelam; DPP4I = dipeptidyl peptidase 4 inhibitors; FPG = fasting plasma glucose; GLP1RA = glucagon-like peptide 1 receptor agonists; Met = metformin; Mod = moderate; PPG = postprandial glucose; SGLT2I = sodium-glucose cotransporter 2 inhibitors; SU = sulfonylureas; TZD = thiazolidinediones.*

*Mild: albiglutide and exenatide; moderate: dulaglutide, exenatide extended release, and liraglutide.

*Continued on next slide*
**Q4. How are glycemic targets achieved for T2D?**

### Effects of Agents Available for T2D

<table>
<thead>
<tr>
<th>NAFLD benefit</th>
<th>Met</th>
<th>GLP1RA</th>
<th>SGLT2I</th>
<th>DPP4I</th>
<th>TZD</th>
<th>AGI</th>
<th>Coles</th>
<th>BCR-QR</th>
<th>SU/Glinide</th>
<th>Insulin</th>
<th>Pram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Mild</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Mod</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypoglycemia</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod to severe* Glinide: mild to mod</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>Slight loss</th>
<th>Loss</th>
<th>Loss</th>
<th>Neutral</th>
<th>Gain</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Gain</th>
<th>Gain</th>
<th>Loss</th>
</tr>
</thead>
</table>

*Especially with short/rapid-acting or premixed.

AGI = α-glucosidase inhibitors; BCR-QR = bromocriptine quick release; Coles = colesevelam; DPP4I = dipeptidyl peptidase 4 inhibitors; GLP1RA = glucagon-like peptide 1 receptor agonists; Met = metformin; Mod = moderate; NAFLD, nonalcoholic fatty liver disease; SGLT2I = sodium-glucose cotransporter 2 inhibitors; SU = sulfonylureas; TZD = thiazolidinediones.

*Especially with short/rapid-acting or premixed.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.

Continued from previous slide
Q4. How are glycemic targets achieved for T2D?

<table>
<thead>
<tr>
<th>Renal impairment/GU</th>
<th>Met</th>
<th>GLP1RA</th>
<th>SGLT2I</th>
<th>DPP4I</th>
<th>TZD</th>
<th>AGI</th>
<th>Coles</th>
<th>BCR-QR</th>
<th>SU/Glinide</th>
<th>Insulin</th>
<th>Pram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraindicated in stage 3B, 4, 5 CKD</td>
<td>Contraindicated</td>
<td>Exenatide contraindicated</td>
<td>CrCl &lt;30 mg/mL</td>
<td>GU infection risk</td>
<td>Dose adjustment (except linaagliptin)</td>
<td>May worsen fluid retention</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Increased hypoglycemia risk</td>
<td>Increased risks of hypoglycemia and fluid retention</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GI adverse effects</th>
<th>Mod</th>
<th>Mod*</th>
<th>Neutral</th>
<th>Neutral*</th>
<th>Neutral</th>
<th>Mod</th>
<th>Mild</th>
<th>Mod</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Neutral</th>
<th>Mod</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral*</td>
<td>Mod</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>CVD</td>
<td>Possible benefit</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Safe</td>
<td>?</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>Bone</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Bone loss</td>
<td>Neutral</td>
<td>Mod bone loss</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td></td>
</tr>
</tbody>
</table>

AGI = α-glucosidase inhibitors; BCR-QR = bromocriptine quick release; Coles = colesevelam; CHF = congestive heart failure; CVD = cardiovascular disease; DPP4I = dipeptidyl peptidase 4 inhibitors; GI = gastrointestinal; GLP1RA = glucagon-like peptide 1 receptor agonists; GU = genitourinary; Met = metformin; Mod = moderate; SGLT2I = sodium-glucose cotransporter 2 inhibitors; SU = sulfonylureas; TZD = thiazolidinediones.

*Caution in labeling about pancreatitis.
†Caution: possibly increased CHF hospitalization risk seen in CV safety trial.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.

Continued from previous slide
Q4. How are glycemic targets achieved for T2D?

**Monotherapy, Dual Therapy, and Triple Therapy for T2D**

<table>
<thead>
<tr>
<th>Monotherapy*</th>
<th>Dual therapy*</th>
<th>Triple therapy*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metformin (or other first-line agent) plus</strong></td>
<td><strong>First- and second-line agent plus</strong></td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>GLP1RA</td>
<td>GLP1RA</td>
</tr>
<tr>
<td>GLP1RA</td>
<td>SGLT2I</td>
<td>SGLT2I</td>
</tr>
<tr>
<td>SGLT2I</td>
<td>DPP4I</td>
<td>TZD†</td>
</tr>
<tr>
<td>DPP4I</td>
<td>TZD†</td>
<td>Basal insulin†</td>
</tr>
<tr>
<td>AGI</td>
<td>Basal insulin†</td>
<td>DPP4I</td>
</tr>
<tr>
<td>TZD†</td>
<td>Colesevelam</td>
<td>Colesevelam</td>
</tr>
<tr>
<td>SU/glinide†</td>
<td>BCR-QR</td>
<td>BCR-QR</td>
</tr>
<tr>
<td>SU/glinide†</td>
<td>AGI</td>
<td>AGI</td>
</tr>
</tbody>
</table>

AGI = α-glucosidase inhibitors; BCR-QR = bromocriptine quick release; Coles = colesevelam; DPP4I = dipeptidyl peptidase 4 inhibitors; GLP1RA = glucagon-like peptide 1 receptor agonists; Met = metformin; SGLT2I = sodium-glucose cotransporter 2 inhibitors; SU = sulfonylureas; TZD = thiazolidinediones.

*Intensify therapy whenever A1C exceeds individualized target. Boldface denotes little or no risk of hypoglycemia or weight gain, few adverse events, and/or the possibility of benefits beyond glucose-lowering.

† Use with caution.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
# Profiles of Antidiabetic Medications

<table>
<thead>
<tr>
<th></th>
<th>MET</th>
<th>GLP-1 RA</th>
<th>SGLT-2i</th>
<th>DPP-4i</th>
<th>AGi</th>
<th>TZD</th>
<th>SU GLN</th>
<th>COLSVL</th>
<th>BCR-QR</th>
<th>INSULIN</th>
<th>PRAML</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HYPO</strong></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate/Severe Mild</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate to Severe</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>Slight Loss</td>
<td>Loss</td>
<td>Loss</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Gain</td>
<td>Gain</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Gain</td>
<td>Loss</td>
</tr>
<tr>
<td><strong>RENAL/GU</strong></td>
<td>Contraindicated CKD Stage 3B,4,5</td>
<td>Exenatide Contraindicated CrCl &lt; 30</td>
<td>Genital Mycotic Infections</td>
<td>Dose Adjustment May be Necessary (Except Linagliptin)</td>
<td>Neutral</td>
<td>May Worsen Fluid Retention</td>
<td>More Hypo Risk</td>
<td>Neutral</td>
<td>Neutral</td>
<td>More Hypo Risk &amp; Fluid Retention</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Gl Sx</strong></td>
<td>Moderate</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Mild</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>CHF</strong></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>CVD</strong></td>
<td>Benefit</td>
<td>Neutral</td>
<td>Increased LDL</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Safe</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>BONE</strong></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate Bone Loss</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

- Green: Few adverse events or possible benefits
- Yellow: Use with caution
- Orange: Likelihood of adverse effects

*COPYRIGHT © 2015 AACE. MAY NOT BE REPRODUCED IN ANY FORM WITHOUT EXPRESS WRITTEN PERMISSION FROM AACE.*
**Algorithm for Adding/Intensifying Insulin**

**Start Basal (long-acting insulin)**

- **A1c < 8%**
  - TDD 0.1–0.2 U/kg
- **A1c > 8%**
  - TDD 0.2–0.3 U/kg

*Insulin titration every 2–3 days to reach glycemic goal:*
- Fixed regimen: Increase TDD by 2 U
- Adjustable regimen:
  - FBG > 180 mg/dL: add 20% of TDD
  - FBG 140–180 mg/dL: add 10% of TDD
  - FBG 110–139 mg/dL: add 1 Unit
- If hypoglycemia, reduce TDD by:
  - BG < 70 mg/dL: 10% – 20%
  - BG < 40 mg/dL: 20% – 40%

*Consider discontinuing or reducing sulfonylurea after basal insulin started (basal analogs preferred to NPH)*

*Glycemic Goal:*
- <7% for most patients with T2DM; fasting and premeal BG < 110 mg/dL; absence of hypoglycemia
- A1c and FBG targets may be adjusted based on patient's age, duration of diabetes, presence of comorbidities, diabetic complications, and hypoglycemia risk

**Intensify (prandial control)**

- **Add GLP-1 RA or SGLT-2i or DPP-4i**
- **Add Prandial Insulin**
  - TDD 0.3–0.5 U/kg
  - 50% Basal Analog
  - 50% Prandial Analog
  - Less desirable: NPH and regular insulin or premixed insulin

*Insulin titration every 2–3 days to reach glycemic goal:*
- Increase prandial dose by 10% for any meal if the 2-hr postprandial or next premeal glucose is > 180 mg/dL
- Premixed: Increase TDD by 10% if fasting/premeal BG > 180 mg/dL
- If fasting AM hypoglycemia, reduce basal insulin
- If nighttime hypoglycemia, reduce basal and/or pre-supper or pre-evening snack short/rapid-acting insulin
- If between-meal daytime hypoglycemia, reduce previous premeal short/rapid-acting insulin
Q5. How should glycemia in T1D be managed?

Insulin Regimens

- Insulin is required for survival in T1D
- Physiologic regimens using insulin analogs should be used for most patients

### Multiple daily injections (MDI)

- 1-2 injections basal insulin per day
- Prandial insulin injections before each meal

### Continuous subcutaneous insulin infusion (CSII)

- Insulin pump using rapid acting insulin analog

Copyright © 2015 AACE. May not be reprinted in any form without express written permission from AACE.
### Pharmacokinetics of Insulin

<table>
<thead>
<tr>
<th>Agent</th>
<th>Onset (h)</th>
<th>Peak (h)</th>
<th>Duration (h)</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPH</td>
<td>2-4</td>
<td>4-10</td>
<td>10-16</td>
<td>Greater risk of nocturnal hypoglycemia compared to insulin analogs</td>
</tr>
<tr>
<td>Glargine</td>
<td>~1-4</td>
<td>No pronounced peak*</td>
<td>Up to 24†</td>
<td>Less nocturnal hypoglycemia compared to NPH</td>
</tr>
<tr>
<td>Detemir</td>
<td>~1-4</td>
<td>No pronounced peak*</td>
<td>Up to 24†</td>
<td>Less nocturnal hypoglycemia compared to NPH</td>
</tr>
<tr>
<td><strong>Basal-Prandial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular U-500</td>
<td>≤0.5</td>
<td>~2-3</td>
<td>12-24</td>
<td>• Inject 30 min before a meal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Indicated for highly insulin resistant individuals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Use caution when measuring dosage to avoid inadvertent overdose</td>
</tr>
<tr>
<td>Regular</td>
<td>~0.5-1</td>
<td>~2-3</td>
<td>Up to 8</td>
<td>• Must be injected 30-45 min before a meal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Injection with or after a meal could increase risk for hypoglycemia</td>
</tr>
<tr>
<td><strong>Prandial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspart</td>
<td>&lt;0.5</td>
<td>~0.5-2.5</td>
<td>~3-5</td>
<td>• Can be administered 0-15 min before a meal</td>
</tr>
<tr>
<td>Glulisine</td>
<td></td>
<td></td>
<td></td>
<td>• Less risk of postprandial hypoglycemia compared to regular insulin</td>
</tr>
<tr>
<td>Lispro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhaled insulin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Exhibits a peak at higher dosages.  
† Dose-dependent.  
NPH, Neutral Protamine Hagedorn.  
Copyright © 2015 AACE.  
May not be reprinted in any form without express written permission from AACE.
Principles of Insulin Therapy in T1D

- Starting dose based on weight
  - Range: 0.4-0.5 units/kg per day
- Daily dosing
  - Basal
    - 40% to 50% TDI
    - Given as single injection of basal analog or 2 injections of NPH per day
  - Prandial
    - 50% to 60% of TDI in divided doses given 15 min before each meal
    - Each dose determined by estimating carbohydrate content of meal
- Higher TDI needed for obese patients, those with sedentary lifestyles, and during puberty

TDI = total daily insulin.

Q5. How should glycemia in T1D be managed?
Consequences of Hypoglycemia

- Cognitive, psychological changes (e.g., confusion, irritability)
- Accidents
- Falls
- Recurrent hypoglycemia and hypoglycemia unawareness
- Refractory diabetes
- Dementia (elderly)
- CV events
  - Cardiac autonomic neuropathy
  - Cardiac ischemia
  - Angina
  - Fatal arrhythmia

Q6. How should hypoglycemia be managed?
## Symptoms of Hypoglycemia

<table>
<thead>
<tr>
<th>Classification</th>
<th>Blood Glucose Level (mg/dL)</th>
<th>Typical Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild hypoglycemia</td>
<td>~50-70</td>
<td>• Neurogenic: palpitations, tremor, hunger, sweating, anxiety, paresthesia</td>
</tr>
<tr>
<td>Moderate hypoglycemia</td>
<td>~50-70</td>
<td>• Neuroglycopenic: behavioral changes, emotional lability, difficulty thinking, confusion</td>
</tr>
<tr>
<td>Severe hypoglycemia</td>
<td>&lt;50*</td>
<td>• Severe confusion, unconsciousness, seizure, coma, death</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Requires help from another individual</td>
</tr>
</tbody>
</table>

*Severe hypoglycemia symptoms should be treated regardless of blood glucose level.*
Q6. How should hypoglycemia be managed?

**Treatment of Hypoglycemia**

- **Hypoglycemia symptoms (BG <70 mg/dL)**
  - **Patient conscious and alert**
    - Consume glucose-containing foods (fruit juice, soft drink, crackers, milk, glucose tablets); avoid foods also containing fat
    - Repeat glucose intake if SMBG result remains low after 15 minutes
    - Consume meal or snack after SMBG has returned to normal to avoid recurrence
  - **Patient severely confused or unconscious (requires help)**
    - Glucagon injection, delivered by another person
    - Patient should be taken to hospital for evaluation and treatment after any severe episode

BG = blood glucose; SMBG = self-monitoring of blood glucose.
Q7. How should hypertension be managed?

Blood Pressure Targets

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>Individualize on the basis of age, comorbidities, and duration of disease, with general target of:</td>
</tr>
<tr>
<td>Systolic, mm Hg</td>
<td>~130</td>
</tr>
<tr>
<td>Diastolic, mm Hg</td>
<td>~80</td>
</tr>
</tbody>
</table>

- A more intensive goal (such as <120/80 mm Hg) should be considered for some patients, provided the target can be safely reached without adverse effects from medication.
- More relaxed goals may be considered for patients with complicated comorbidities or those experience adverse medication effects.
Q7. How should hypertension be managed?

Blood Pressure Treatment

- Employ therapeutic lifestyle modification
  - DASH or other low-salt diet
  - Physical activity
- Select antihypertensive medications based on BP-lowering effects and ability to slow progression of nephropathy and retinopathy
  - ACE inhibitors
  - or
  - ARBs
- Add additional agents when needed to achieve blood pressure targets
  - Calcium channel antagonists
  - Diuretics
  - Combined α/β-adrenergic blockers
  - β-adrenergic blockers
  - Do not combine ACE inhibitors with ARBs

ACE = angiotensin converting enzyme; ARB = angiotensin II receptor blocker; BP = blood pressure; DASH = Dietary Approaches to Stop Hypertension.
## Q8. How should dyslipidemia be managed?

### Lipid Targets

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Moderate risk</strong></td>
</tr>
<tr>
<td><strong>Primary Goals</strong></td>
<td></td>
</tr>
<tr>
<td>LDL-C, mg/dL</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Non-HDL-C, mg/dL</td>
<td>&lt;130</td>
</tr>
<tr>
<td>Triglycerides, mg/dL</td>
<td>&lt;150</td>
</tr>
<tr>
<td>TC/HDL-C ratio</td>
<td>&lt;3.5</td>
</tr>
<tr>
<td><strong>Secondary Goals</strong></td>
<td></td>
</tr>
<tr>
<td>ApoB, mg/dL</td>
<td>&lt;90</td>
</tr>
<tr>
<td>LDL particles</td>
<td>&lt;1,200</td>
</tr>
</tbody>
</table>

- **Moderate risk** = diabetes or prediabetes with no ASCVD or major CV risk factors
- **High risk** = established ASCVD or ≥1 major CV risk factor
- **CV risk factors**
  - Hypertension
  - Family history
  - Low HDL-C
  - Smoking

ApoB = apolipoprotein B; ASCVD = atherosclerotic cardiovascular disease; CV = cardiovascular; HDL-C = high density lipoprotein cholesterol; LDL = low-density lipoprotein; LDL-C = low-density lipoprotein cholesterol; TC = total cholesterol.
Q8. How should dyslipidemia be managed?

Lipid Management

<table>
<thead>
<tr>
<th>Elevated LDL-C, non-HDL-C, TG, TC/HDL-C ratio, ApoB, LDL particles</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Statin = treatment of choice</td>
</tr>
<tr>
<td>• Add bile acid sequestrant, niacin, and/or cholesterol absorption inhibitor if target not met on maximum-tolerated dose of statin</td>
</tr>
<tr>
<td>• Use bile acid sequestrant, niacin, or cholesterol absorption inhibitor instead of statin if contraindicated or not tolerated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LDL-C at goal but non-HDL-C not at goal (TG ≥200 mg/dL and/or low HDL-C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May use fibrate, niacin, or high-dose omega-3 fatty acid to achieve non-HDL-C goal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TG ≥500 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use high-dose omega-3 fatty acid, fibrate, or niacin to reduce TG and risk of pancreatitis</td>
</tr>
</tbody>
</table>

ApoB = apolipoprotein B; HDL-C = high density lipoprotein cholesterol; LDL = low-density lipoprotein; LDL-C = low-density lipoprotein cholesterol; TC = total cholesterol; TG = triglycerides.
Q9. How is nephropathy managed in patients with diabetes?

Assessment of Diabetic Nephropathy

- Annual assessments
  - Serum creatinine to determine eGFR
  - Urine AER
- Begin annual screening
  - 5 years after diagnosis of T1D if diagnosed before age 30 years
  - At diagnosis of T2D or T1D in patients diagnosed after age 30 years

AER = albumin excretion rate; eGFR = estimated glomerular filtration rate; T1D = type 1 diabetes; T2D = type 2 diabetes.
### Staging of Chronic Kidney Disease

<table>
<thead>
<tr>
<th>Previous NKF CKD stage</th>
<th>Guide to frequency of monitoring (number of times per year) by GFR and albuminuria category</th>
<th>Persistent albuminuria categories Description and range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A1 Normal to mildly increased</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;30 mg/g &lt;3 mg/mmol</td>
</tr>
<tr>
<td>1 G1</td>
<td>Normal or high ≥90</td>
<td>1 if CKD</td>
</tr>
<tr>
<td>2 G2</td>
<td>Mildly decreased 60-89</td>
<td>1 if CKD</td>
</tr>
<tr>
<td>3 G3a</td>
<td>Mild to moderately decreased 45-59</td>
<td>1</td>
</tr>
<tr>
<td>4 G3b</td>
<td>Moderately to severely decreased 30-44</td>
<td>2</td>
</tr>
<tr>
<td>5 G4</td>
<td>Severely decreased 15-29</td>
<td>3</td>
</tr>
<tr>
<td>6 G5</td>
<td>Kidney failure &lt;15</td>
<td>4+</td>
</tr>
</tbody>
</table>

CKD = chronic kidney disease; GFR = glomerular filtration rate; NKF = National Kidney Foundation.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
Q9. How is nephropathy managed in patients with diabetes?

Management of Diabetic Nephropathy

- Optimal control of blood pressure, glucose, and lipids
- Smoking cessation
- RAAS blockade
  - ACE inhibitor, ARB, or renin inhibitor
  - Do not combine RAAS blocking agents
  - Monitor serum potassium
- Nephrologist referral
  - Atypical presentation
  - Rapid decline in eGFR or albuminuria progression
  - Stage 4 CKD

ACE = angiotensin converting enzyme; ARB = angiotensin II receptor blocker; CKD = chronic kidney disease; eGFR = estimated glomerular filtration rate; RAAS = renin angiotensin aldosterone system.
Q10. How is retinopathy managed in patients with diabetes?

Assessment of Diabetic Retinopathy

- Annual dilated eye examination by experienced ophthalmologist or optometrist
- Begin assessment
  - 5 years after diagnosis of T1D
  - At diagnosis of T2D
- More frequent examinations for:
  - Pregnant women with DM during pregnancy and 1 year postpartum
  - Patients with diagnosed retinopathy
  - Patients with macular edema receiving active therapy

DM = diabetes mellitus; T1D = type 1 diabetes; T2D = type 2 diabetes.
Q10. How is retinopathy managed in patients with diabetes?

Management of Diabetic Retinopathy

- Slow retinopathy progression by maintaining optimal control of:
  - Blood glucose
  - Blood pressure
  - Lipids

- For active retinopathy, refer to ophthalmologist as needed:
  - For laser therapy
  - For vascular endothelial growth factor therapy

DM = diabetes mellitus; T1D = type 1 diabetes; T2D = type 2 diabetes.
Q11. How is neuropathy diagnosed and managed in patients with diabetes?

Assessment of Diabetic Neuropathy

- Complete neurologic examination annually
- Begin assessment
  - 5 years after diagnosis of T1D
  - At diagnosis of T2D

T1D = type 1 diabetes; T2D = type 2 diabetes.
Q11. How is neuropathy diagnosed and managed in patients with diabetes?

### Diabetic Neuropathy Evaluations and Tests

| **Foot inspection** | Foot structure and deformities  
|                     | Skin temperature and integrity  
|                     | Ulcers  
|                     | Vascular status  
|                     | Pedal pulses  
|                     | Amputations  |

| **Neurologic testing** | Loss of sensation, using 1 and 10-g monofilament  
|                       | Vibration perception using 128-Hz tuning fork  
|                       | Ankle reflexes  
|                       | Touch, pinprick, and warm and cold sensation  |

| **Painful neuropathy** | May have no physical signs  
|                        | Diagnosis may require skin biopsy or other surrogate measure  |

| **Cardiovascular autonomic neuropathy** | Heart rate variability with:  
|                                           | • Deep inspiration  
|                                           | • Valsalva maneuver  
|                                           | • Change in position from prone to standing  |

DM = diabetes mellitus; T1D = type 1 diabetes; T2D = type 2 diabetes.
Q11. How is neuropathy diagnosed and managed in patients with diabetes?

## Diabetic Neuropathy Management

### All neuropathies
- Prevent by controlling blood glucose to individual targets
- No therapies proven to reverse neuropathy once it is established
- May slow progression by maintaining optimal glucose, blood pressure, and lipid control and using other interventions that reduce oxidative stress

### Painful neuropathy
- Tricyclic antidepressants, anticonvulsants, serotonin reuptake inhibitors, or norepinephrine reuptake inhibitors

### Large-fiber neuropathies
- Strength, gait, and balance training
- Orthotics to prevent/treat foot deformities
- Tendon lengthening for pes equinus
- Surgical reconstruction
- Casting

### Small-fiber neuropathies
- Foot protection (eg, padded socks)
- Supportive shoes with orthotics if needed
- Regular foot inspection
- Prevention of heat injury
- Emollient creams
Q12. How is CVD managed in patients with diabetes?

Comprehensive Management of CV Risk

- Manage CV risk factors
  - Weight loss
  - Smoking cessation
  - Optimal glucose, blood pressure, and lipid control
- Use low-dose aspirin for secondary prevention of CV events in patients with existing CVD
  - May consider low-dose aspirin for primary prevention of CV events in patients with 10-year CV risk >10%
- Measure coronary artery calcification or use coronary imaging to determine whether glucose, lipid, or blood pressure control efforts should be intensified

CV = cardiovascular; CVD = cardiovascular disease.
Q12. How is CVD managed in patients with diabetes?

Statin Use

- Majority of patients with T2D have a high cardiovascular risk
- People with T1D are at elevated cardiovascular risk
- LDL-C target: <70 mg/dL—for the majority of patients with diabetes who are determined to have a high risk
- Use a statin regardless of LDL-C level in patients with diabetes who meet the following criteria:
  - >40 years of age
  - ≥1 major ASCVD risk factor
    - Hypertension
    - Family history of CVD
    - Low HDL-C
    - Smoking

ASCVD = atherosclerotic cardiovascular disease; CVD = cardiovascular disease; HDL-C = high density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol.
Diagnosis of Obesity and Staging of for Management

- Diagnose obesity according to body mass index (BMI)
  - Overweight: BMI 25-29.9 kg/m²
  - Obese*: BMI ≥30 kg/m²
- Consider waist circumference measurement for patients with BMI between 25 and 35 kg/m²
  - Larger waist circumference = higher risk for metabolic disease
    - Men: >102 cm (40 in)
    - Women: >88 cm (35 in)
- Evaluate patients for obesity-related complications to determine disease severity and appropriate management

*BMI 23-24.9 may be considered obese in certain ethnicities; perform waist circumference and use ethnicity-specific criteria in risk analysis.
Q13. How is obesity managed in patients with diabetes?

Medical Complications of Obesity

**Obesity**

- Biomechanical
  - Dismotility/disability
  - GERD
  - Lung function defects
  - Osteoarthritis
  - Sleep apnea
  - Urinary incontinence

- Cardiometabolic
  - Dyslipidemia
  - Hypertension
  - Prediabetic states
  - NAFLD
  - PCOS

- Diabetes

- Cardiovascular Disease

- Other
  - Androgen deficiency
  - Cancer
  - Gallbladder disease
  - Psychological disorders

GERD, gastroesophageal reflux disease; NAFLD, nonalcoholic fatty liver disease; PCOS, polycystic ovary syndrome.


Copyright © 2015 AACE.

May not be reprinted in any form without express written permission from AACE.
Complications-Centric Model for Care of the Overweight/Obese Patient

**Step 1: Evaluation for Complications and Staging**

- **Cardiometabolic Disease**
  - No Complications (BMI 25–26.9, or BMI ≥ 27)
  - Biomechanical Complications (BMI ≥ 27 with complications)
    - Stage Severity of Complications: Low, Medium, High

**Step 2: Select**

- Therapeutic targets for improvement in complications
- Treatment modality
- Treatment intensity for weight loss based on staging

**Lifestyle Modification:**
- MD/RD counseling; web/remote program; structured multidisciplinary program

**Medical Therapy:**
- Phentermine; orlistat; lorcaserin; phentermine/topiramate ER; naltrexone/bupropion; liraglutide

**Surgical Therapy (BMI ≥ 35):**
- Lap band; gastric sleeve; gastric bypass

**Step 3**

If therapeutic targets for improvements in complications not met, intensify lifestyle and/or medical and/or surgical treatment modalities for greater weight loss.
Obstructive Sleep Apnea

**Risk Factors**
- Obesity
- Male sex
- Neck circumference >44 cm
- Age
- Narrowed airway
- Family history
- Hypertension
- Alcohol or sedatives
- Smoking

**Treatment Options**
- Weight loss
- Continuous positive airway pressure (CPAP)
- Additional options
  - Adjustable airway pressure devices
  - Oral appliances
  - Surgery
    - Uvulopalatopharyngoplasty (UPPP)
    - Maxillomandibular advancement
    - Tracheostomy

Q14. What is the role of sleep medicine in the care of the patient with diabetes?
Q15. How is diabetes managed in the hospital?

Glucose Screening and Monitoring

- Laboratory blood glucose testing on admission, regardless of DM history
  - Known DM: assess A1C if not measured in past 3 months
  - No history of DM: assess A1C to identify undiagnosed cases
- Bedside glucose monitoring for duration of hospital stay
  - Diagnosed DM
  - No DM but receiving therapy associated with hyperglycemia
    - Corticosteroids
    - Enteral or parenteral nutrition

DM = diabetes mellitus.
**Q15. How is diabetes managed in the hospital?**

**Inpatient Glucose Targets for Nonpregnant Adults**

<table>
<thead>
<tr>
<th>Hospital Unit</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensive/critical care</strong></td>
<td></td>
</tr>
<tr>
<td>Glucose range, mg/dL</td>
<td>140-180*</td>
</tr>
<tr>
<td><strong>General medicine and surgery, non-ICU</strong></td>
<td></td>
</tr>
<tr>
<td>Premeal glucose, mg/dL</td>
<td>&lt;140*</td>
</tr>
<tr>
<td>Random glucose, mg/dL</td>
<td>&lt;180*</td>
</tr>
</tbody>
</table>

*Provided target can be safely achieved.*

ICU = intensive care unit.

Copyright © 2015 AACE.

May not be reprinted in any form without express written permission from AACE.
Q15. How is diabetes managed in the hospital?

Glucose Control

**Hyperglycemia**
- Critically ill/ICU patients
  - Regular insulin by intravenous infusion
- Noncritically ill
  - Insulin analogs by scheduled subcutaneous basal, nutritional, and correctional components
  - Synchronize dosing with meals or enteral or parenteral nutrition
- Exclusive use of sliding scale insulin is discouraged

**Hypoglycemia**
- Establish plan for treating hypoglycemia in each insulin-treated patient
- Document each episode of hypoglycemia in medical record

**Discharge Plans**
- Include appropriate provisions for glucose control in the outpatient setting

ICU = intensive care unit.
### Annual Incidence of DM in Youth

<table>
<thead>
<tr>
<th>Rate (per 100,000 per year)</th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All</strong></td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>NHW</strong></td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td><strong>NHB</strong></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td><strong>API</strong></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>AIAN</strong></td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td><strong>NHW</strong></td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>NHB</strong></td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>API</strong></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>AIAN</strong></td>
<td>5</td>
<td>2.5</td>
</tr>
</tbody>
</table>


AI = American Indians; API = Asians/Pacific Islanders; DM = diabetes mellitus; H = Hispanics; NHB = non-Hispanic blacks; NHW = non-Hispanic whites.

Q16. How is a comprehensive care plan established in children and adolescents?
### Management of DM

#### T1D
- Use MDI or CSII insulin
  - In children younger than 4 years, bolus insulin may be given after, rather than before, meals due to variable carbohydrate intake
  - Higher insulin-to-carbohydrate ratios may be needed during puberty
  - Pubescent girls may require 20% to 50% increases in insulin dose during menstrual periods

#### T2D
- Lifestyle modification is first-line therapy
- Metformin, alone or in combination with insulin, is approved by the FDA to treat T2D in pediatric patients
- Rosiglitazone and glimepiride have also been studied in pediatric patients with T2D

---

Q16. How is a comprehensive care plan established in children and adolescents?
### Outpatient Glucose Targets for Pregnant Women

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gestational diabetes mellitus (GDM)</strong></td>
<td></td>
</tr>
<tr>
<td>Preprandial glucose, mg/dL</td>
<td>≤95*</td>
</tr>
<tr>
<td>1-Hour PPG, mg/dL</td>
<td>≤140*</td>
</tr>
<tr>
<td>2-Hour PPG, mg/dL</td>
<td>≤120*</td>
</tr>
<tr>
<td><strong>Preexisting T1D or T2D</strong></td>
<td></td>
</tr>
<tr>
<td>Premeal, bedtime, and overnight glucose, mg/dL</td>
<td>60-99*</td>
</tr>
<tr>
<td>Peak PPG, mg/dL</td>
<td>100-129*</td>
</tr>
<tr>
<td>A1C</td>
<td>≤6.0%*</td>
</tr>
</tbody>
</table>

*Provided target can be safely achieved.

FPG = fasting plasma glucose; PPG = postprandial glucose.

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
Q17. How should diabetes in pregnancy be managed?

Treatment of DM During Pregnancy

- All women with T1D, T2D, or previous GDM should receive preconception care to ensure adequate nutrition and glucose control before conception, during pregnancy, and in the postpartum period.
- Use insulin to treat hyperglycemia in T1D and T2D and when lifestyle measures do not control glycemia in GDM.
  - Basal insulin: NPH or insulin detemir
  - Prandial insulin: insulin analogs preferred, but regular insulin acceptable if analogs not available.
Self-monitoring of Blood Glucose (SMBG)

Q18. When and how should glucose monitoring be used?

Noninsulin Users

- Introduce at diagnosis
- Personalize frequency of testing
- Use SMBG results to inform decisions about whether to target FPG or PPG for any individual patient

Insulin Users

- All patients using insulin should test glucose
  - ≥2 times daily
  - Before any injection of insulin
- More frequent SMBG (after meals or in the middle of the night) may be required
  - Frequent hypoglycemia
  - Not at A1C target

Testing positively affects glycemia in T2D when the results are used to:
- Modify behavior
- Modify pharmacologic treatment
Q18. When and how should glucose monitoring be used?

SMBG Frequency vs A1C


Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
Q18. When and how should glucose monitoring be used?

Continuous Glucose Monitoring (CGM)

**Uses**

- Consider for T1D patients (and insulin-using T2D patients) to improve A1C and reduce hypoglycemia
- Features
  - “Real-time” glucose values (but 7- to 15-minute lag between plasma and interstitial glucose and receiver display)
  - Hypo- and hyperglycemia alarms
  - Wireless interfaces with downloadable/printable data

**Limitations**

- Invasive (worn like a pump)
- Requires daily calibration with fingerstick SMBG
- Lengthy data download time
- Requires highly motivated/informed patients and healthcare support team
  - Must be able to interpret data trends rather than data points

Copyright © 2015 AACE.
May not be reprinted in any form without express written permission from AACE.
Continuous Subcutaneous Insulin Infusion (CSII)

• Consider for
  • T1D patients
  • Insulinopenic T2D patients unable to achieve optimal glucose control with multiple daily injections of insulin

• All patients should be motivated and well educated in DM self-management as well as CSII use

• Prescribing physicians should have expertise in CSII

• CSII devices with a threshold-suspend function may be considered
### CSII Meta-Analyses in T1D and T2D

<table>
<thead>
<tr>
<th>Reference</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weissberg-Benchell et al, <em>Diabetes Care</em>. 2003;26(4):1079-1087</td>
<td>Compared with MDI, CSII therapy was associated with significant improvements in glycemic control based on HbA₁c and mean blood glucose decreases</td>
</tr>
<tr>
<td>Jeitler et al, <em>Diabetologia</em>. 2008;51(6):941-951</td>
<td>HbA₁c reduction greater and insulin requirements lower with CSII than with MDI in adults and adolescents with T1DM; hypoglycemia risk comparable among adult patients (data unavailable for adolescent subjects); no conclusive CSII benefits for patients with T2DM</td>
</tr>
<tr>
<td>Fatourechi et al, <em>J Clin Endocrinol Metab</em>. 2009;94(3):729-740</td>
<td>In patients with T1DM, HbA₁c was mildly decreased with CSII vs. MDI; CSII effect on hypoglycemia unclear; similar CSII and MDI outcomes among patients with T2DM</td>
</tr>
<tr>
<td>Pickup &amp; Sutton, <em>Diabet Med</em>. 2008;25(7):765-774</td>
<td>HbA₁c was lower for CSII than for MDI, with greatest improvement in patients with highest initial HbA₁c values on MDI; severe hypoglycemia risk was decreased with CSII vs. MDI; greatest reduction in patients with diabetes of longest duration and/or highest baseline rates of severe hypoglycemia</td>
</tr>
<tr>
<td>Monami et al, <em>Exp Clin Endocrinol Diabetes</em>. 2009;117(5):220-222</td>
<td>HbA₁c was significantly lower with CSII vs. MDI; HbA₁c reduction was only evident for studies with mean patient age &gt;10 years; severe hypoglycemia occurred at comparable rates with CSII and MDI therapy</td>
</tr>
</tbody>
</table>

CSII, continuous subcutaneous insulin infusion; DKA, diabetic ketoacidosis; HbA₁c, hemoglobin A₁c; MDI, multiple daily injections; RCT, randomized controlled trial; T1DM, type 1 diabetes mellitus; T2D, type 2 diabetes.
## CSII Randomized, Controlled Trials in T2D

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Baseline</th>
<th>CSII</th>
<th>MDI</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noh et al, <em>Diabetes Metab Res Rev.</em> 2008;24(5):384-391.</td>
<td>30-week observational study (N=15)</td>
<td>7.9</td>
<td>5.0</td>
<td>NA</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Parkner et al, <em>Diabetes Obes Metab.</em> 2008;10(7):556-563.</td>
<td>Observational study, 3 successive nights (N=10)</td>
<td>Fasting plasma glucose: 209 mg/dL</td>
<td>99.1 mg/dL</td>
<td>NA</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Berthe et al, <em>Horm Metab Res.</em> 2007;39(3):224-229.</td>
<td>Crossover study, 2 12-week periods (N=17)</td>
<td>9.0</td>
<td>7.7</td>
<td>8.6</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Herman et al, <em>Diabetes Care.</em> 2005;28(7):1568-1573.</td>
<td>1 year parallel study (N=107)</td>
<td>CSII: 8.4 MDI: 8.1</td>
<td>6.6</td>
<td>6.4</td>
<td>0.19</td>
</tr>
<tr>
<td>Raskin et al, <em>Diabetes Care.</em> 2003;26(9):2598-2603</td>
<td>24 week parallel study (N=132)</td>
<td>CSII: 8.2 MDI: 8.0</td>
<td>7.6</td>
<td>7.5</td>
<td>NS</td>
</tr>
<tr>
<td>Wainstein et al, <em>Diabet Med.</em> 2005;22(8):1037-1046.</td>
<td>Crossover study, 2 18-week periods (N=40)</td>
<td>CSII-MDI: 10.1 MDI-CSII 10.2</td>
<td>-0.8</td>
<td>+0.4</td>
<td>0.007</td>
</tr>
</tbody>
</table>

CSII: continuous subcutaneous insulin infusion; MDI: multiple daily injection; T2DM: type 2 diabetes.
Q20. What is the imperative for education and team approach in DM management?

DM Comprehensive Management Team

- Endocrinologist
- PCP
- Physician assistant / Nurse practitioner
- Registered nurse
- CDE
- Dietitian
- Exercise specialist
- Mental health care professional
- Patient
Vaccinations for Patients with DM

<table>
<thead>
<tr>
<th>Vaccine, frequency of administration</th>
<th>Patient age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine childhood immunizations, according to standard schedule (eg, measles, mumps, rubella, varicella, polio, tetanus-diphtheria)</td>
<td>6 months to 18 years</td>
</tr>
<tr>
<td>Influenza, annually</td>
<td>≥6 months</td>
</tr>
<tr>
<td>Pneumococcal polysaccharide vaccine</td>
<td>≥2 years</td>
</tr>
<tr>
<td>PVC13, 1-2 injections</td>
<td>2-18 years</td>
</tr>
<tr>
<td>PPSV23, 1 injection</td>
<td>19-64 years</td>
</tr>
<tr>
<td>PVC13 plus PPSV23, 1 injection each, in series</td>
<td>≥65 years</td>
</tr>
<tr>
<td>Hepatitis B, 1 injection</td>
<td>20-59 years*</td>
</tr>
<tr>
<td>Tetanus-diphtheria booster, every 10 years in adults</td>
<td>≥19 years</td>
</tr>
<tr>
<td>Individuals not already immunized for childhood diseases and those requiring vaccines for endemic diseases should be immunized as required by individual patient needs</td>
<td>Any age</td>
</tr>
</tbody>
</table>

*Consider for patients ≥60 based on assessment of risk and likelihood of adequate immune response.
Q22. How should depression be managed in the context of diabetes?

DM and Depression

• Screen all adults with DM for depression
  • Untreated comorbid depression can have serious clinical implications for patients with DM
• Consider referring patients with depression to mental health professionals who are knowledgeable about DM
DM and Cancer

- Screen obese individuals with DM more frequently and rigorously for certain cancers
  - Endometrial, breast, hepatic, bladder, pancreatic, colorectal cancers
- Increased BMI (≥25 kg/m²) also increases risk of some cancers
  - Strong associations: endometrial, gall bladder, esophageal, renal, thyroid, ovarian, breast, and colorectal cancer
  - Weaker associations: leukemia, malignant and multiple melanoma, pancreatic cancer, non-Hodgkin lymphoma
- To date, no definitive relationship has been established between specific hyperglycemic agents and increased risk of cancer or cancer-related mortality
  - Consider avoiding medications considered disadvantageous to specific cancers in individuals at risk for or with a history of that cancer
Q24. Which occupations have specific diabetes management requirements?

DM and Occupational Hazards

- Commercial drivers at high risk for developing T2D
  - Screen as appropriate
  - Encourage healthy lifestyle change
- Be aware of management requirements and use agents with reduced risk of hypoglycemia in patients with occupations that could put others at risk, such as (not inclusive):
  - Commercial drivers
  - Pilots
  - Anesthesiologists
  - Commercial or recreational divers