American Diabetes Association 2018 -Standards of Medical Care in Diabetes

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The *Standards of Care* are published annually- this version became available 12/2017 and was a supplement to the January 2018 print issue of Diabetes Care.

Grading of Evidence

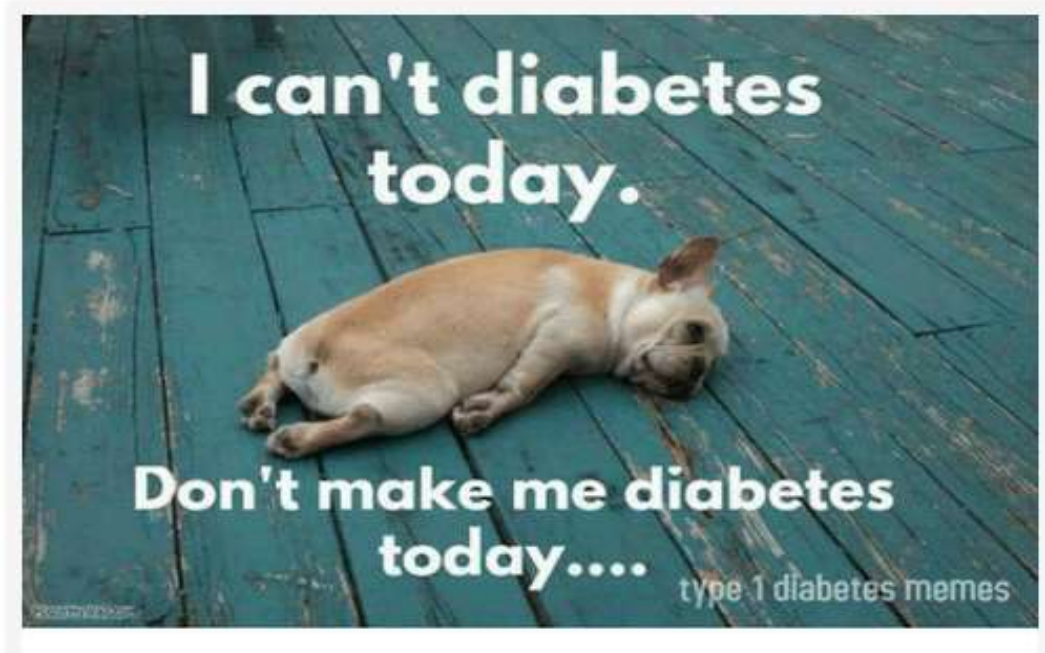
ADA's grading system uses A, B, C, E to show the evidence level that supports each recommendation.

- **A**—Clear evidence from well-conducted, generalizable randomized controlled trials that are adequately powered
- **B**—Supportive evidence from well-conducted cohort studies
- **C**—Supportive evidence from poorly controlled or uncontrolled studies
- **E**—Expert consensus or clinical experience

IMPROVING CARE AND PROMOTING HEALTH IN POPULATIONS

- Over the past 10 years, patients w/ diabetes who achieve recommended A1C, BP, and LDL cholesterol levels has increased.
- The mean A1C nationally among people with diabetes has declined from 7.6% from 1999–2002 to 7.2% from 2007–2010 (NHANES).
- Also major improvements in CV outcomes and reductions in microvascular complications

Nevertheless, 33–49% of patients still do not meet targets for glycemic, blood pressure, or cholesterol control, and only 14% meet targets for all three measures while also avoiding smoking.



Optimal diabetes management requires an organized, systematic approach and the involvement of a coordinated team of dedicated health care professionals working in an environment where patient-centered high-quality care is a priority.

RECOMMENDATIONS

- Ensure treatment decisions are timely, rely on evidence-based guidelines, and are made with patients based on individual preferences, prognoses, and comorbidities. **B**

- Emphasize productive interactions between a prepared proactive care team and an informed activated patient. **A**

- Care systems should facilitate team-based care, patient registries and community involvement to meet patient needs. **B**
- 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. **E**

Tailoring Treatment for Social Context

- Health inequities related to diabetes are well documented and are heavily influenced by social determinants of health.
- Social determinants of health are defined as:

  Economic, Environmental, Political, Social conditions in which people live

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**

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Diabetes Support Group

Event Location: **St. Mary's Catholic Church Peace Hall, University Ave., Morgantown, WV**

Sarah Edwards, a Certified Diabetes Educator with the WVU Diabetes Education Center, will present "Ten Tips for Staying Healthy with Diabetes." All are welcome and the event is completely free.

Diabetes Education Center Support Group

Day: Typically every second Thursday of the month

Time: 6:30 – 7:30 pm

Location: St. Mary's Catholic Church Peace Hall, 3334 University Avenue, Star City

More information: 304-598-4391

In order to reach as many people as possible in the community, the Diabetes Learning Center at Mon Health Medical Center engages in a wide range of outreach activities. We encourage you to take advantage of any of them that may be helpful to you or your loved ones.

Diabetes Support Group

Anyone living with diabetes – or affected by it – is invited to attend our free diabetes support group, which meets on the third Wednesday of each month from 11:30 a.m. to 12:30 p.m. in the Hazel Ruby McQuain Conference Center, at the back of the main hospital. Registration is not required..

Diabetes Health Fair

Mon Health holds a Diabetes Health Fair each year in November as part of the American Diabetes Month®. This event includes multiple free screenings and diabetes-related product and information booths.

Community Events and Screenings

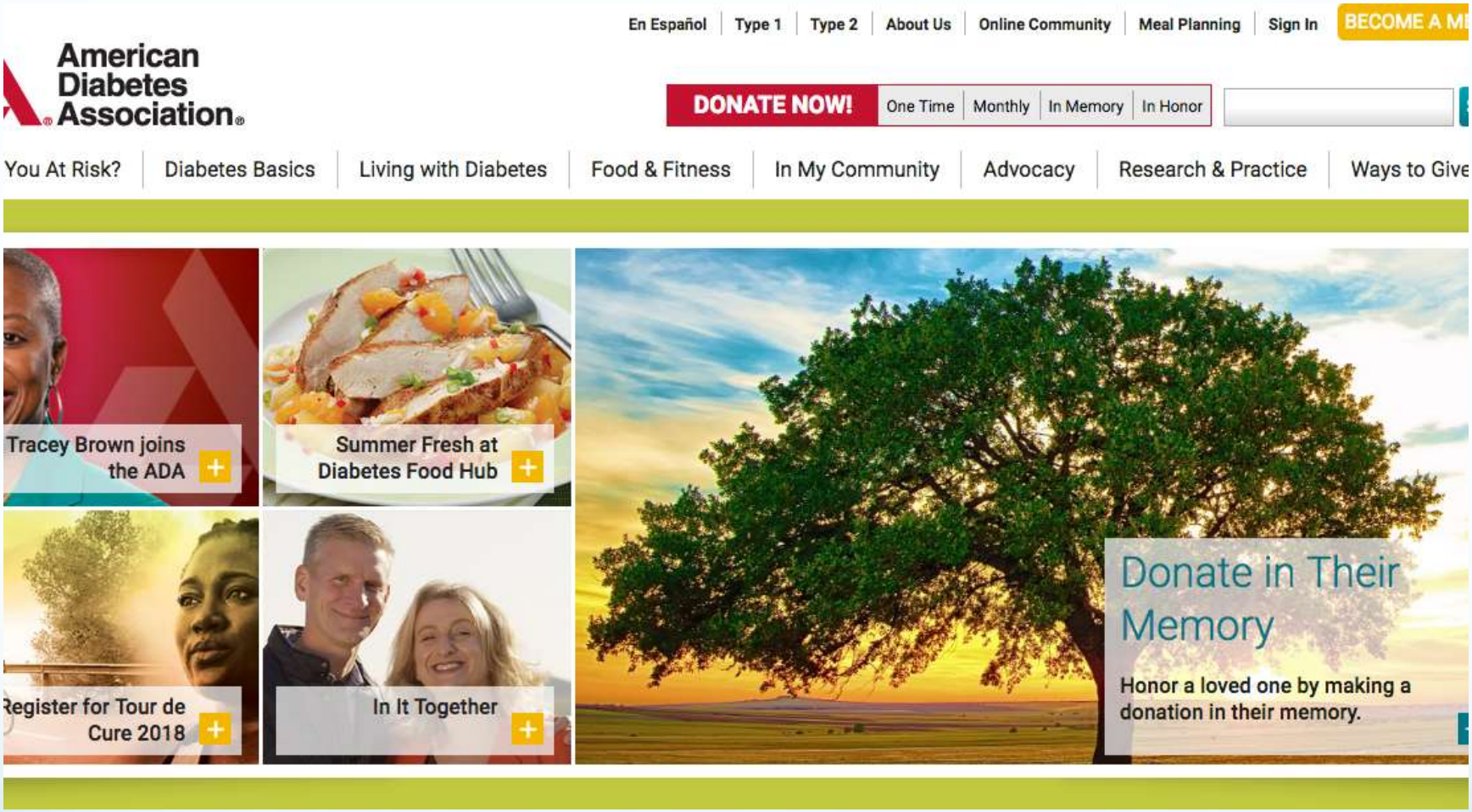
We offer blood glucose screenings and other educational events, such as supermarket tours or lectures, at various times and locations.

For more information:

Andrea S. McCarty, MS, RDN, LD, CDE

Diabetes Education Coordinator

304-598-1805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Ways to Give
Tracey Brown joins the ADA
Summer Fresh at Diabetes Food Hub
Register for Tour de Cure 2018
In It Together
Donate in Their Memory
Honor a loved one by making a donation in their memory.

CLASSIFICATION AND DIAGNOSIS OF DIABETES

1.Type 1 diabetes (autoimmune β-cell destruction, absolute insulin deficiency)

2. Type 2 diabetes (progressive loss of β-cell insulin secretion frequently on the background of insulin resistance)

3.Gestational diabetes mellitus (GDM) (diabetes diagnosed in the 2nd or 3rd trimester of pregnancy that was not clearly overt diabetes prior to gestation)

4.Specific types of diabetes due to other causes:

- Monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young)
- Diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis)
- Drug- or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation)
- Autoimmune Insulin Resistance Syndromes

Diagnostic Tests for Diabetes

TABLE 1. Criteria for the Screening and Diagnosis of Diabetes

	Prediabetes	Diabetes
A1C	5.7–6.4%*	≥6.5%†
FPG	100–125 mg/dL (5.6–6.9 mmol/L)*	≥126 mg/dL (7.0 mmol/L)†
OGTT	140–199 mg/dL (7.8–11.0 mmol/L)*	≥200 mg/dL (11.1 mmol/L)†
RPG	—	≥200 mg/dL (11.1 mmol/L)‡

**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. †In the absence of unequivocal hyperglycemia, results should be confirmed by repeat testing. ‡Only diagnostic in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis. RPG, random plasma glucose.*

- There is some discordance between A1C, FPG, and 2-h PG.
- The 2-h PG diagnoses more people with diabetes than the FPG or A1C.
- When there are discrepancies between A1C and plasma glucose levels consider that the A1C assay may not be reliable for that individual (sickle cell trait or hemoglobinopathies) that may skew A1C result

- Unless there is a clear clinical diagnosis based on overt signs of hyperglycemia, a second test is required for confirmation, either repeating the same test used initially or a different test.
- If patients have test results near the margins of the diagnostic threshold, repeat 3–6 months.

Trivia Time

- Where did the name diabetes come from?

1) Meaning sweet urine
2) Meaning urinating twice as much
3) Meaning flowing through

Trivia

- The Greek physician Aretaeus (30-90CE) was credited with coming up with the name "diabetes." He recorded a disease with symptoms such as constant thirst (polydipsia), excessive urination (polyuria) and weight loss.
- He named the condition "diabetes," meaning "a flowing through.

Categories of Increased Risk for Diabetes (Prediabetes)

- “Prediabetes” glucose levels do not meet the criteria for diabetes but are too high to be considered normal.
- Prediabetes should be viewed as increased risk for diabetes and cardiovascular disease (CVD).

TABLE 2. Criteria for Testing for Diabetes or Prediabetes in Asymptomatic Adults

1. Testing should be considered in overweight or obese (BMI ≥25 kg/m^2 or ≥23 kg/m^2 in Asian Americans) adults who have one or more of the following risk factors:
   - First-degree relative with diabetes
   - High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
   - History of CVD
   - Hypertension (≥140/90 mmHg or on therapy for hypertension)
   - HDL cholesterol level <35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
   - Women with polycystic ovary syndrome
   - Physical inactivity
   - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
2. Patients with prediabetes (A1C ≥5.7% [39 mmol/mol], IGT, or IFG) should be tested yearly.
3. Women who were diagnosed with GDM should have lifelong testing at least every 3 years.
4. For all other patients, testing should begin at age 45 years.
5. If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.

COMPREHENSIVE MEDICAL EVALUATION AND ASSESSMENT OF COMORBIDITIES

A patient-centered communication style that uses person-centered and strength-based language, uses active listening, elicits patient preferences and beliefs, and assesses literacy and potential barriers to care should be used. **B**

- A complete medical evaluation should be performed at the initial visit to:
- ❍ Confirm the diagnosis and classify diabetes. **B**
- ❍ Evaluate for diabetes complications and potential comorbid conditions. **E**
- ❍ Begin patient engagement in the formulation of a care management plan. **B**
- ❍ Develop a plan for continuing care. **B**

Components of the Comprehensive Diabetes Medical Evaluation at Initial and Follow-Up Visits

TABLE 4. Components of the Comprehensive Diabetes Medical Evaluation at Initial and Follow-Up Visits

		INITIAL VISIT	EVERY FOLLOW-UP VISIT	ANNUAL VISIT
PAST MEDICAL AND FAMILY HISTORY	**Diabetes history** • Characteristics at onset (e.g., age, symptoms) • Review of previous treatment regimens and response • Assess frequency/cause/severity of past hospitalizations	✓ ✓ ✓		
	Family history • Family history of diabetes in a first-degree relative • Family history of autoimmune disorder	✓ ✓		
	Personal history of complications and common comorbidities • Macrovascular and microvascular • Common comorbidities • Presence of hemoglobinopathies or anemias • High blood pressure or abnormal lipids • Last dental visit • Last dilated eye exam • Visits to specialists	✓ ✓ ✓ ✓ ✓ ✓ ✓	 ✓	 ✓ ✓ ✓
	Interval history • Changes in medical/family history since last visit		✓	✓
SOCIAL HISTORY	**Assess lifestyle and behavior patterns** • Eating patterns and weight history • Sleep behaviors and physical activity • Familiarity with carbohydrate counting in type 1 diabetes • Tobacco, alcohol, and substance use • Identify existing social supports	✓ ✓ ✓ ✓ ✓	✓ ✓	✓ ✓
	Interval history • Changes in social history since last visit		✓	✓
MEDICATIONS AND VACCINATIONS	• Medication-taking behavior • Medication intolerance or side effects • Complementary and alternative medicine use • Vaccination history and needs	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓ ✓
TECHNOLOGY USE	• Assess use of health apps, online education, patient portals, etc. • Glucose monitoring (meter/CGM): results and data use • Review insulin pump settings	✓ ✓ ✓	 ✓ ✓	✓ ✓ ✓
SCREENING	**Psychosocial conditions** • Screen for depression, anxiety, and disordered eating; refer for further assessment or intervention if warranted • Consider assessment for cognitive impairment*	✓ ✓		✓ ✓
	Diabetes self-management education and support • History of dietitian/diabetes educator visits • Screen for barriers to diabetes self-management • Refer or offer local resources and support as needed	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
	Hypoglycemia • Timing of episodes, awareness, frequency and causes	✓	✓	✓
	Pregnancy planning • For women with childbearing capacity, review contraceptive needs and preconception planning	✓	✓	✓

TABLE CONTINUED ON P. 19 →

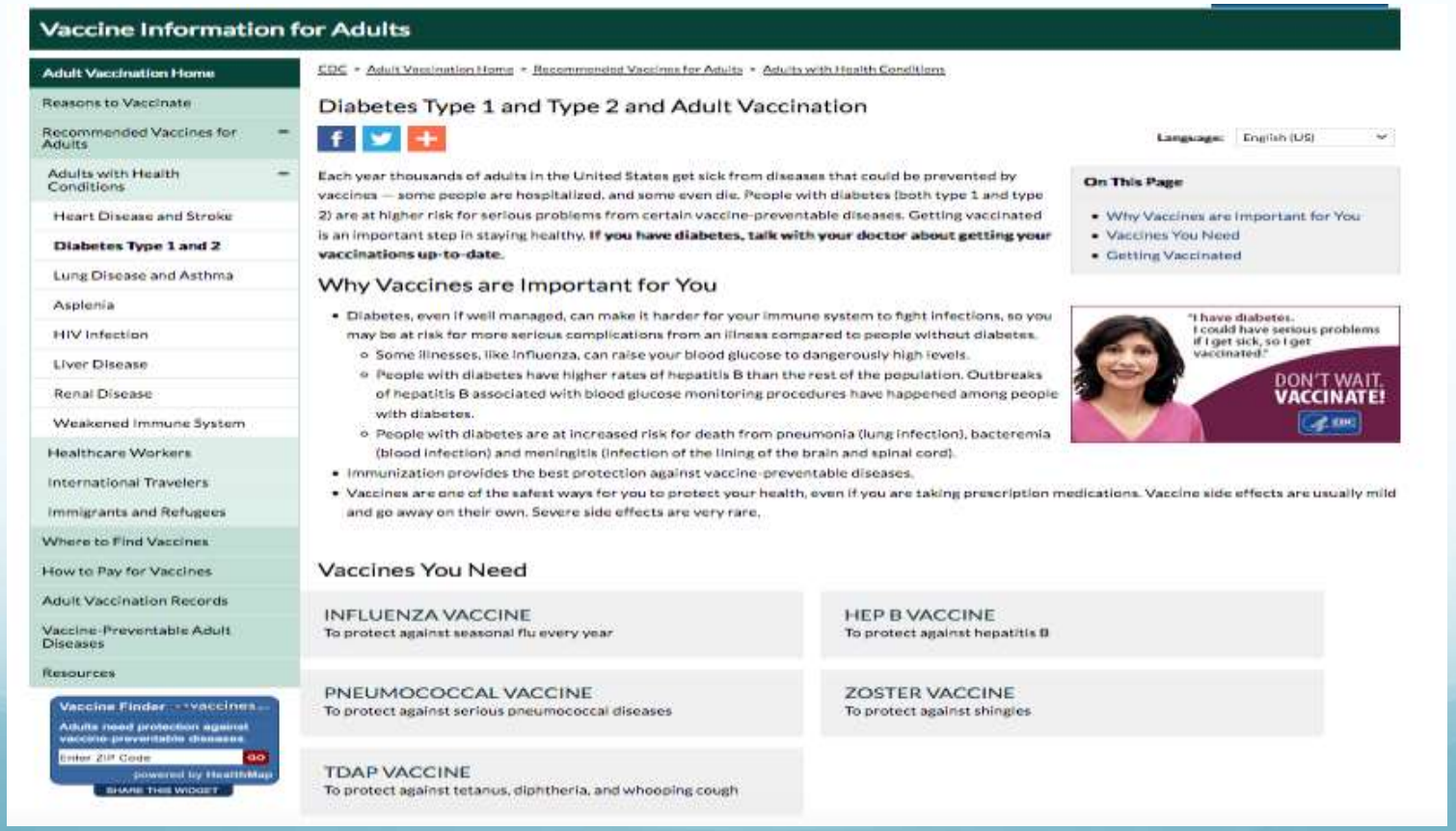
TABLE 4. Components of the Comprehensive Diabetes Medical Evaluation at Initial and Follow-Up Visits, *continued from p. 18*

		INITIAL VISIT	EVERY FOLLOW-UP VISIT	ANNUAL VISIT
PHYSICAL EXAMINATION	• Height, weight, and BMI; growth/pubertal development in children and adolescents	✓	✓	✓
	• Blood pressure determination	✓	✓	✓
	• Orthostatic blood pressure measures (when indicated)	✓		
	• Fundoscopic examination (refer to eye specialist)	✓		✓
	• Thyroid palpation	✓		✓
	• Skin examination (e.g., acanthosis nigricans, insulin injection or insertion sites, lipodystrophy)	✓	✓	✓
	• Comprehensive foot examination			
	◦ Visual inspection (e.g., skin integrity, callous formation, foot deformity, or ulcer, toenails)	✓	✓	✓
	◦ Screen for PAD (pedal pulses; refer for ABI if diminished)	✓		✓
	◦ Determination of temperature, vibration or pinprick sensation, and 10-g monofilament exam	✓		✓
LABORATORY EVALUATION	• A1C, if the results are not available within the past 3 months	✓	✓	✓
	• If not performed/available within the past year			
	◦ Lipid profile, including total, LDL, and HDL cholesterol and triglycerides[F]	✓		✓[*]
	◦ Liver function tests[¶]	✓		✓
	◦ Spot urinary albumin-to-creatinine ratio	✓		✓
	◦ Serum creatinine and estimated glomerular filtration rate[†]	✓		✓
	◦ Thyroid-stimulating hormone in patients with type 1 diabetes[#]	✓		✓
	◦ Vitamin B12 if on metformin (when indicated)	✓		
	◦ Serum potassium levels in patients on ACE inhibitors, ARBs, or diuretics[†]	✓		✓
ASSESSMENT AND PLAN	**Goal setting**			
	• Set A1C/blood glucose target and monitoring frequency	✓	✓	✓
	• If hypertension diagnosed, establish blood pressure goal	✓		✓
	• Incorporate new members to the care team as needed	✓	✓	✓
	• Diabetes education and self-management support needs	✓	✓	✓
	Cardiovascular risk assessment and staging of CKD			
	• History of ASCVD	✓	✓	✓
	• Presence of ASCVD risk factors (see Table 9.2)	✓	✓	✓
	• Staging of CKD (see Table 10.1)[†]	✓	✓	✓
	Therapeutic treatment plan			
	• Lifestyle management	✓	✓	✓
	• Pharmacologic therapy	✓	✓	✓
	• Referrals to specialists (including dietitian and diabetes educator) as needed	✓	✓	✓
	• Use of glucose monitoring and insulin delivery devices	✓	✓	✓

Tables 9.2 and 10.1 are in the full 2018 Standards of Care. [*]≥65 years. [†]May be needed more frequently in patients with known CKD or with changes in medications that affect kidney function and serum potassium (see Table 10.2 in the full *Standards of Care*). [#]May also need to be checked after initiation or dose changes of medications that affect these laboratory values (i.e., diabetes, blood pressure, cholesterol, or thyroid medications). [¶]In people without dyslipidemia and not on cholesterol-lowering therapy, testing may be less frequent. ABI, ankle-brachial pressure index.

Immunization

- Adults with diabetes should receive vaccinations according to age specific recommendations. See the Centers for Disease Control and Prevention website for current recommendations.



- Provide routinely recommended vaccinations for children and adults with diabetes by age. C
- Annual vaccination against influenza is recommended for all people >6 months of age, including those with diabetes. C
- Vaccination against pneumococcal disease, including pneumococcal pneumonia, with 13-valent pneumococcal conjugate vaccine (PCV13) is recommended for children before age 2 years. People with diabetes ages 2 through 64 years should also receive 23-valent pneumococcal polysaccharide vaccine (PPSV23). At age 65 years, regardless of vaccination history, additional PPSV23 vaccination is necessary. C
- Administer 3-dose series of hepatitis B vaccine to unvaccinated adults with diabetes ages 19 through 59 years. C
- Consider administering 3-dose series of hepatitis B vaccine to unvaccinated adults with diabetes ages >60 years. C

Assessment of Comorbidities

- Besides assessing diabetes-related complications, be aware of common comorbidities that affect people with diabetes and may complicate management.

Autoimmune Diseases

- Consider screening patients with type 1 diabetes for autoimmune thyroid disease and celiac disease soon after diagnosis. **B**

Cognitive Impairment/ Dementia

- In people with a history of cognitive impairment/dementia, treatment should be tailored to avoid significant hypoglycemia. **B**

Conditions more commons in persons with diabetes

- Fatty liver disease
- Hepatocellular carcinoma
- Hip fractures
- Low testosterone in men
- Obstructive sleep apnea
- Periodontal disease

Cancer

- Diabetes is associated with increased risk of cancers of the liver, pancreas, endometrium, colon/rectum, breast, and bladder.
- The association may result from shared risk factors between type 2 diabetes and cancer (older age, obesity, and physical inactivity) but may also be due to diabetes-related factors, such as underlying disease physiology or diabetes treatments.

- Patients with diabetes should be encouraged to undergo recommended age- and sex-appropriate cancer screenings and to reduce their modifiable cancer risk factors (obesity, physical inactivity, and smoking).

LIFESTYLE MANAGEMENT

- Lifestyle management is a fundamental aspect of diabetes care and includes:
  - diabetes self-management education and support (DSMES)
  - medical nutrition therapy (MNT)
  - physical activity
  - smoking cessation counseling
  - psychosocial care.

Recommendations

All people with diabetes should participate in DSMES to facilitate the knowledge, skills, and ability necessary for self-care and self-management **B**

- There are four critical times to evaluate the need for DSMES:
  - At diagnosis
  - Annually
  - when complicating factors arise
  - When transitions in care occur. **E**

Recommendations

- Facilitating appropriate diabetes self-management and improving clinical outcomes, health status, and quality of life are key goals of DSMES to be measured and monitored as part of routine care. **C**
- Effective DSMES should be patient centered, may be given in group or individual settings or using technology, and should help guide clinical decisions. **A**
- Because DSMES can improve outcomes and reduce costs **B**, adequate reimbursement by third- party payers is recommended. **E**

Trivia Time

- What are water tasters?

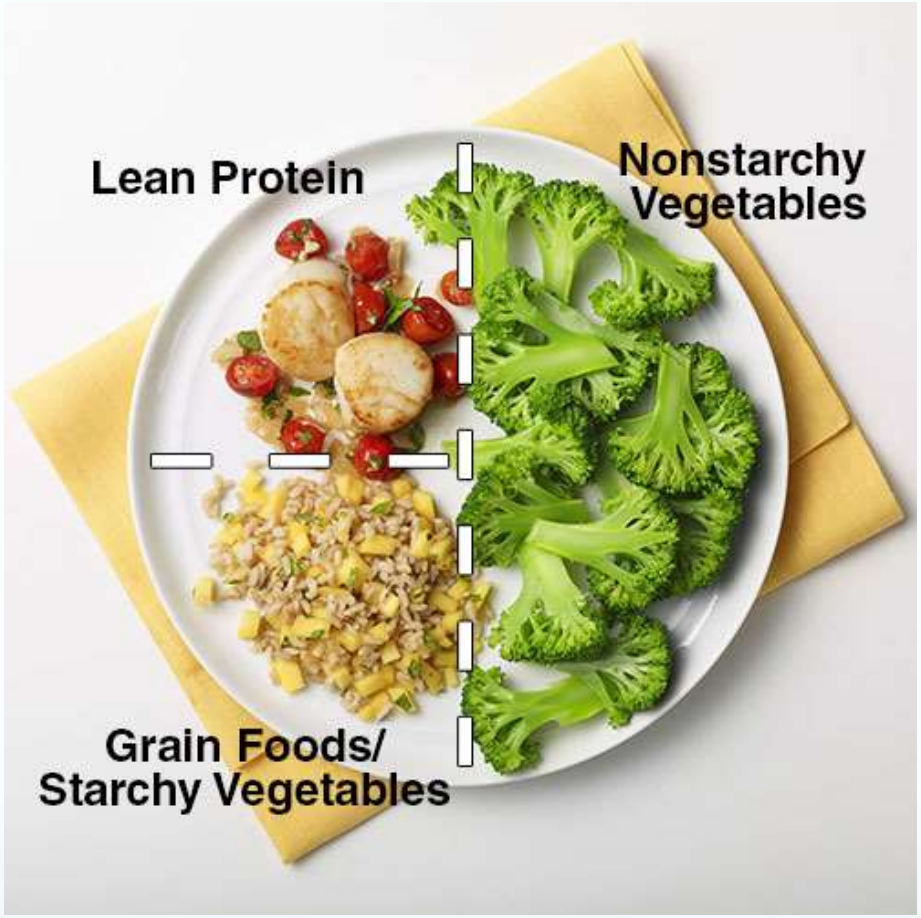
1. People who liked different types of water
2. People who tested urine to see if it was sweet and attracted ants or flies
3. People who tasted urine to check for diabetes


I'VE SENT YOUR URINE
OUT FOR FURTHER TASTING
diabeteswa


Before modern testing methods,
doctors would actually taste a patient's
urine if they suspected the person
had diabetes.
ird-facts.org
@factsweird

Nutrition Therapy

- Goals of nutrition therapy are to promote and support healthful eating patterns in achieving and maintaining body weight, BG, blood pressure, and lipid goals while addressing individual issues, including access to healthful foods, personal and cultural preferences, and other factors.
- The diabetes plate method is commonly used for providing basic meal planning guidance.


Lean Protein
Nonstarchy Vegetables
Grain Foods/ Starchy Vegetables

Weight Management

- Lifestyle intervention programs should be intensive and have frequent follow-up
- There is strong and consistent evidence that modest persistent weight loss can delay the progression from prediabetes → diabetes and is beneficial to the management of T2DM

Alcohol

- Moderate alcohol intake does not have major detrimental effects on long-term blood glucose control in people with diabetes.
- Risks associated with alcohol consumption include hypoglycemia (esp those using insulin or insulin secretagogue therapies), weight gain, and hyperglycemia (for those consuming excessive amounts).

Nonnutritive Sweeteners

- For some people with diabetes who are used to sugar-sweetened products, nonnutritive sweeteners (containing few or no calories) may be an acceptable substitute for nutritive sweeteners.

Physical Activity

- Most adults with type 1 **C** and type 2 **B** diabetes should engage in 150 min or more of moderate- to-vigorous intensity aerobic activity per week, spread over at least 3 days/week, with no more than 2 consecutive days without activity
- Adults with type 1 **C** and type 2 **B** diabetes should engage in 2–3 sessions/week of resistance exercise on nonconsecutive days.
- All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behavior. **B** Prolonged sitting should be interrupted every 30 min **C**
- Flexibility and balance training are recommended 2–3 times/week for older adults with diabetes. (Yoga and tai-chi). **C**

Exercise in the Presence of Specific Long-term Complications of Diabetes

- Retinopathy

- If proliferative diabetic retinopathy or severe NPDR is present, then vigorous/intense exercise **may be contraindicated** because of the risk of triggering vitreous hemorrhage or retinal detachment.

- Consultation with an ophthalmologist prior to engaging in an intense exercise regimen may be appropriate.

- Peripheral Neuropathy

- Decreased pain sensation and a higher pain threshold in the extremities result in an increased risk of skin breakdown, infection, and Charcot joint destruction with some forms of exercise.

Autonomic Neuropathy

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

Psychosocial Issues

- Psychosocial care should be integrated with a collaborative, patient- centered approach and provided to all people with diabetes **A**

- Psychosocial screening and follow-up may include:

1. attitudes about diabetes
2. expectations for medical management and outcomes
3. affect or mood
4. general and diabetes-related quality of life
5. available resources (financial, social, and emotional),
6. psychiatric history. **E**

- Providers should consider assessment for symptoms of diabetes distress, depression, anxiety, disordered eating, and cognitive capacity. **B**
- Consider screening older adults (aged ≥65 years) with diabetes for cognitive impairment and depression. **B**

Diabetes Distress (DD)

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

- DD is very common and is distinct from other psychological disorders.
- refers to significant negative psychological reactions related to emotional burdens and worries specific to an individual's experience in having to manage a severe, complicated, and demanding chronic disease such as diabetes.
- If identified, the person should be referred for specific diabetes education to address areas of diabetes self-care that are most relevant to the patient and impact clinical management.

Serious Mental Illness

- Annually screen people who are prescribed atypical antipsychotic medications for prediabetes or diabetes. **B**

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

TABLE 5. Situations That Warrant Referral of a Person With Diabetes to a Mental Health Provider for Evaluation and Treatment

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

PREVENTION OR DELAY OF TYPE 2 DIABETES

- At least annual monitoring for the development of diabetes in those with prediabetes is suggested. **E**
- Patients with prediabetes should be referred to an intensive behavioral lifestyle intervention program

Pharmacologic Interventions

- Metformin therapy for prevention of type 2 diabetes should be considered in those with prediabetes. **A**
- Long-term use of metformin may be associated with vitamin B12 deficiency, and periodic measurement of vitamin B12 levels should be considered- especially in those with anemia or peripheral neuropathy. **B**

- Pharmacologic agents including metformin, α-glucosidase inhibitors, orlistat, (GLP-1) receptor agonists, and TZD's have each been shown to decrease incident diabetes to various degrees in those with prediabetes in research studies, though none are approved by the U.S. FDA specifically for diabetes prevention.
- Metformin has the strongest evidence base and long-term safety as pharmacologic therapy for diabetes prevention

Trivia Time

- What does the word pancreas mean?

1. Gland separated into multiple cells/ducts
2. Fish like gland
3. Sweet bread

- The pancreas was first identified by Herophilus (335–280 BC), a Greek anatomist and surgeon.[33] A few hundred years later, Rufus of Ephesus, another Greek anatomist, gave the pancreas its name. Etymologically, the term "pancreas", a modern Latin adaptation of Greek πάγκρεας,[34] [πᾶν ("all", "whole"), and κρέας ("flesh")],[35] originally means sweetbread,[36] although literally meaning all-flesh, presumably because of its fleshy consistency.

GLYCEMIC TARGETS

- **Assessment of Glycemic Control**
  Self-monitoring of blood glucose (SMBG) frequency and timing should be dictated by patients' specific needs and goals.
- SMBG is especially important for patients treated with insulin to monitor for and prevent asymptomatic hypoglycemia and hyperglycemia.

Recommendations

- Most patients using intensive insulin regimens (MDI) or insulin pump therapy should perform SMBG

1. prior to meals and snacks
2. at bedtime
3. occasionally postprandially
4. prior to exercise
5. when they suspect low blood glucose
6. after treating low blood glucose until they are normoglycemic
7. prior to critical tasks such as driving. **B**

- SMBG allows patients to evaluate their responses to therapy and assess whether targets are being met.
- It can help in preventing hypoglycemia and adjusting medications
- Evidence supports a correlation between SMBG frequency and lower A1C in insulin treated patients.

- Evidence is lacking on when and how often SMBG is needed for patients who do not use intensive insulin regimens such as those with type 2 diabetes using oral agents and/or basal insulin.

- SMBG accuracy is dependent on both the instrument and the user.
- Evaluate each patient’s technique initially and at regular intervals thereafter. Evaluate the ongoing need for and frequency of SMBG at each visit.
- CGM measures interstitial glucose (which correlates well with plasma glucose), and most CGM devices include alarms for both hypoglycemic and hyperglycemic excursions.
- A “ flash” CGM device, which does not have alarm functions, was recently approved for use in adults.


FreeStyle
Libre

A1C Testing

- Perform the A1C test at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control). **E**
- Perform the A1C test quarterly in patients whose therapy has changed or who are not meeting glycemic goals. **E**
- Point-of-care (POC) testing for A1C provides the opportunity for more timely treatment changes. **E**

A1C Goals

- A reasonable A1C goal for many non-pregnant adults is <7% **A**
- Providers might reasonably suggest more stringent A1C goals (<6%) if this can be achieved without significant hypoglycemia.**C**
- Less stringent A1C goals (such as <8% may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, or long-standing diabetes in whom the goal is difficult to achieve despite diabetes self-management education, appropriate glucose monitoring, and effective doses of multiple glucose-lowering agents including insulin. **B**

Hypoglycemia

- • Individuals at risk for hypoglycemia should be asked about symptomatic and asymptomatic hypoglycemia at each encounter. **C**

- Glucagon should be prescribed for all individuals at increased risk of clinically significant hypoglycemia
- Caregivers, school personnel, or family members of these individuals should know where it is and when and how to administer it. **E**

- Hypoglycemia unawareness or one or more episodes of severe hypoglycemia should trigger reevaluation of the tx regimen. **E**
- Insulin-treated patients with hypoglycemia unawareness or an episode of clinically significant hypoglycemia should be advised to raise their glycemic targets to strictly avoid hypoglycemia for at least several weeks in order reverse hypoglycemia unawareness **A**
- Ongoing assessment of cognitive function is suggested with increased vigilance for hypoglycemia by the clinician, patient, and caregivers if low cognition or declining cognition is found. **B**

OBESITY MANAGEMENT FOR THE TREATMENT OF TYPE 2 DIABETES

- There is strong and consistent evidence that obesity management can delay the progression from prediabetes to type 2 diabetes and may be beneficial in the treatment of type 2 diabetes.
- In overweight and obese patients with type 2 diabetes, modest and sustained weight loss has been shown to improve glycemic control and to reduce the need for glucose- lowering medications.

- At each patient encounter, BMI should be calculated and documented in the medical record. **B**
- Providers should advise overweight and obese patients that, in general, higher BMIs increase the risk of CVD and all-cause mortality.
- Providers should assess each patient’s readiness to achieve weight loss and jointly determine weight loss goals and intervention strategies.

Diet, Physical Activity, and Behavioral Therapy

- Diet, physical activity, and behavioral therapy designed to achieve >5% weight loss should be prescribed for overweight and obese patients with type 2 diabetes **A**
- Interventions should be high intensity (≥16 sessions in 6 months) and focus on diet, physical activity, and behavioral strategies to achieve a 500–750 kcal/day energy deficit. **A**
- Diets should be individualized **A**
- For patients who achieve short- term weight-loss goals, long-term (≥1 year) comprehensive weight maintenance programs should be prescribed. Such programs should provide at least monthly contact and encourage ongoing monitoring of body weight (weekly or more frequently), continued consumption of a reduced-calorie diet, and participation in high levels of physical activity (200–300 min/week). **A**

Pharmacotherapy

- When choosing glucose-lowering medications for overweight or obese patients with type 2 diabetes, consider their effect on weight. **E**
- Whenever possible, minimize the medications for comorbid conditions that are associated with weight gain. **E**
- Weight loss medications may be effective as adjuncts to diet, physical activity, and behavioral counseling for selected patients with type 2 diabetes and BMI ≥27. **A**

- If a patient’s response to weight loss medications is <5% weight loss after 3 months or if there are any safety or tolerability issues at any time, the medication should be discontinued and alternative medications or treatment approaches should be considered. **A**

Trivia Time

- When were the first portable blood glucose meters able to be used at home for patients?
- 1) 1960
- 2) 1970
- 3) 1980

- In 1969-1970, the first portable blood glucose meter was created by Ames Diagnostics. It was called the Ames Reflectance Meter (ARM). Ames later became a part of Bayer. The device looked a lot like the tricorder devices used in the original Star Trek series.
- They cost about $650 and were only for doctors to use in their practices or hospitals. Portable blood glucose meters for home use by patients were not sold in the U.S. until the 1980's.


GLUCOMETER® II MODEL 5550
REFLECTANCE PHOTOMETER
TEST STEPS.....Read Operating Manual for detailed instructions.
ready
on
---
start
50
Drop
20
Blot
• Insert strip
• Close door
• Read
• Record
AMES DIVISION MILES LABORATORIES INC., P.O. BOX 70, ELKHART, INDIANA 46515
MADE IN U.S.A. U.S. PATENT PENDING FOR IN VITRO DIAGNOSTIC USE
program
ready
low battery
USE GLUCOSTIX ONLY
on-off
program
start

Metabolic Surgery

- Metabolic surgery should be **recommended** as an option to treat type 2 diabetes in appropriate surgical candidates with BMI ≥40 (BMI ≥37.5 in Asian Americans) and in adults with BMI 35.0–39.9 (32.5–37.4 in Asian Americans) when hyperglycemia is inadequately controlled despite lifestyle and optimal medical therapy. **A**

- Metabolic surgery should be **considered** as an option for adults with type 2 diabetes and BMI 30.0–34.9 (27.5–32.4 in Asian Americans) if hyperglycemia is inadequately controlled despite optimal medical control by either oral or injectable medications (including insulin). **B**

- Metabolic surgery should be performed in high-volume centers with multidisciplinary teams that understand and are experienced in the management of diabetes and gastrointestinal surgery. **C**

- Long-term lifestyle support and routine monitoring of micronutrient and nutritional status must be provided to patients after surgery, according to guidelines for postoperative management of metabolic surgery by national and international professional societies. **C**

- People presenting for metabolic surgery should receive a comprehensive mental health assessment. **B**
- Surgery should be postponed in patients with histories of alcohol or substance abuse, significant depression, suicidal ideation, or other mental health conditions until these conditions have been fully addressed. **E**

- People who undergo metabolic surgery should be evaluated to assess the need for ongoing mental health services to help them adjust to medical and psychosocial changes after surgery. **C**

PHARMACOLOGIC APPROACHES TO GLYCEMIC TREATMENT

- **Pharmacologic Therapy for Type 1 Diabetes**
- Most people with type 1 diabetes should be treated with an MDI regimen of prandial insulin and basal insulin or continuous subcutaneous insulin infusion (CSII). **A**
- Most individuals with type 1 diabetes should use rapid-acting insulin analogs to reduce hypoglycemia risk. **A**
- Consider educating individuals with type 1 diabetes on matching prandial insulin doses to carbohydrate intake, premeal blood glucose levels, and anticipated physical activity. **E**
- Individuals with type 1 diabetes who have been successfully using CSII should have continued access to this therapy after they turn 65 years of age. **E**

- **Pharmacologic Therapy for Type 2 Diabetes**
- Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacologic agent for the treatment of type 2 diabetes. **A**
- Consider initiating insulin therapy (with or without additional agents) in patients with newly diagnosed type 2 diabetes who are symptomatic and/or have A1C ≥10% and/or blood glucose levels ≥300 mg/dL **E**

- Consider initiating dual therapy in patients with newly diagnosed type 2 diabetes who have A1C ≥9% **E**

- In patients without atherosclerotic CVD (ASCVD), if monotherapy or dual therapy does not achieve or maintain the A1C goal over 3 months, add an additional anti-hyperglycemic agent. **A**

- In patients with type 2 diabetes and established ASCVD, anti- hyperglycemic therapy should begin with lifestyle management and metformin and subsequently incorporate an agent proven to reduce major adverse cardiovascular events and cardiovascular mortality (currently empaglifozin and liraglutide), after considering drug-specific and patient factors. **A**

- In patients with type 2 diabetes and established ASCVD, after lifestyle management and metformin, the antihyperglycemic agent canagliflozin may be considered to reduce major adverse cardiovascular events, based on drug-specific and patient factors. **C**

TABLE 7. Drug-Specific and Patient Factors to Consider When Selecting Antihyperglycemic Treatment in Adults With Type 2 Diabetes

	Efficacy*	Hypoglycemia	Weight Change	CV Effects		Cost	Oral/SQ	Renal Effects		Additional Considerations
				ASCVD	CHF			Progression of DKD	Dosing/Use considerations	
Metformin	High	No	Neutral (Potential for Modest Loss)	Potential Benefit	Neutral	Low	Oral	Neutral	• Contraindicated with eGFR <30	• Gastrointestinal side effects common (diarrhea, nausea) • Potential for B12 deficiency
SGLT-2 Inhibitors	Intermediate	No	Loss	Benefit: canagliflozin, empagliflozin†	Benefit: canagliflozin, empagliflozin	High	Oral	Benefit: canagliflozin, empagliflozin	• Canagliflozin: not recommended with eGFR <45 • Dapagliflozin: not recommended with eGFR <60; contraindicated with eGFR <30 • Empagliflozin: contraindicated with eGFR <30	• **FDA Black Box:** Risk of amputation (**canagliflozin**) • Risk of bone fractures (canagliflozin) • DKA risk (all agents, rare in T2DM) • Genitourinary infections • Risk of volume depletion, hypotension • ↑LDL cholesterol
GLP-1 RAs	High	No	Loss	Neutral: lixisenatide, exenatide extended release Benefit: liraglutide†	Neutral	High	SQ	Benefit: liraglutide	• Exenatide: not indicated with eGFR <30 • Lixisenatide: caution with eGFR <30 • Increased risk of side effects in patients with renal impairment	• **FDA Black Box:** Risk of thyroid C-cell tumors (**liraglutide, albiglutide, dulaglutide, exenatide extended release**) • Gastrointestinal side effects common (nausea, vomiting, diarrhea) • Injection site reactions • ?Acute pancreatitis risk
DPP-4 Inhibitors	Intermediate	No	Neutral	Neutral	Potential Risk: saxagliptin, alogliptin	High	Oral	Neutral	• Renal dose adjustment required; can be used in renal impairment	• Potential risk of acute pancreatitis • Joint pain
Thiazolidinediones	High	No	Gain	Potential Benefit: pioglitazone	Increased Risk	Low	Oral	Neutral	• No dose adjustment required • Generally not recommended in renal impairment due to potential for fluid retention	• **FDA Black Box:** Congestive heart failure [**pioglitazone, rosiglitazone**] • Fluid retention (edema; heart failure) • Benefit in NASH • Risk of bone fractures • Bladder cancer (pioglitazone) • ↑LDL cholesterol (rosiglitazone)
Sulfonylureas (2nd Generation)	High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	• Glyburide: not recommended • Glipizide & glimepiride: initiate conservatively to avoid hypoglycemia	• FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Insulin — Human Insulin	Highest	Yes	Gain	Neutral	Neutral	Low	SQ	Neutral	• Lower insulin doses required with a decrease in eGFR; titrate per clinical response	• Injection site reactions • Higher risk of hypoglycemia with human insulin (NPH or premixed formulations) vs. analogs
Insulin — Analogs						High	SQ			

*See Inzucchi et al. Diabetes Care 2015;38:140–149 for description of efficacy. †U.S. Food and Drug Administration–approved for CVD benefit. NASH, nonalcoholic steatohepatitis; RAs, receptor agonists; SQ, subcutaneous; T2DM, type 2 diabetes.

Antihyperglycemic Therapy in Adults with Type 2 Diabetes

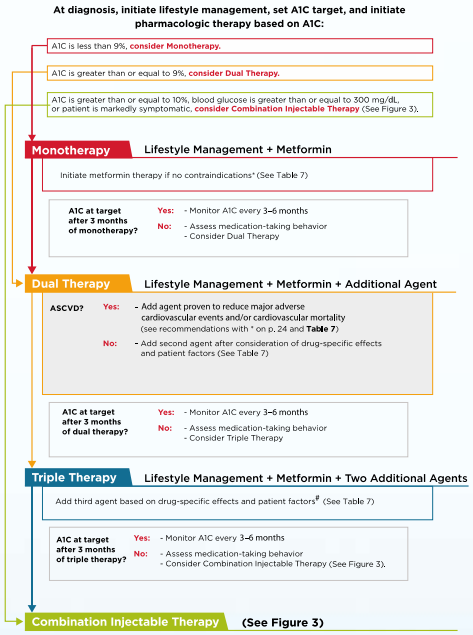


FIGURE 2. Antihyperglycemic therapy in type 2 diabetes: general recommendations. *If patient does not tolerate or has contraindications to metformin, consider agents from another class in Table 7. #GLP-1 receptor agonists and DPP-4 inhibitors should not be prescribed in combination. If a patient with ASCVD is not yet on an agent with evidence of cardiovascular risk reduction, consider adding.

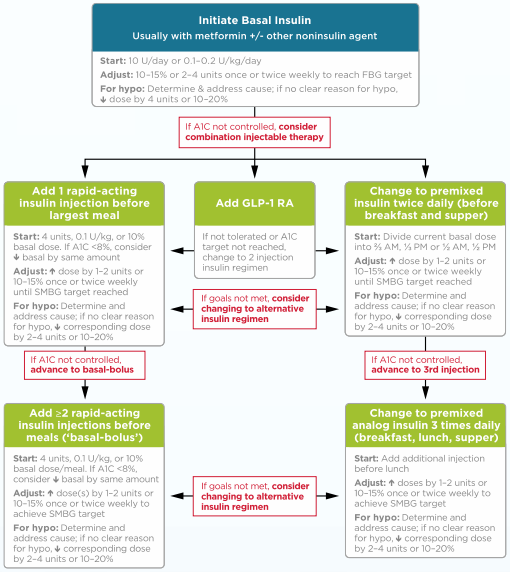


FIGURE 3. Combination injectable therapy for type 2 diabetes. FBG, fasting blood glucose; hypo, hypoglycemia. Adapted with permission from Inzucchi et al. *Diabetes Care* 2015;38:140–149.

tiation or a change in dose, and annually thereafter as it may help to monitor the response to therapy and inform adherence. E

- For patients of all ages with diabetes and ASCVD, high-intensity statin therapy should be added to lifestyle therapy. A
- For patients with diabetes aged <40 years with additional ASCVD risk factors, the patient and provider should consider using moderate-intensity statin in addition to lifestyle therapy. C
- For patients with diabetes aged 40–75 years A and >75 years B without ASCVD, use moderate-intensity statin in addition to lifestyle therapy.
- In clinical practice, providers may need to adjust the intensity of statin therapy based on individual patient response to medication (e.g., side effects, tolerability, LDL cholesterol levels, or percent LDL reduction on statin therapy). For patients who do not tolerate the intended intensity of the statin, the maximally tolerated statin dose should be used. E
- For patients with diabetes and ASCVD, if LDL cholesterol is ≥70 mg/dL (3.9 mmol/L) on maxi-

Thank you!

- References:
  ADA Standards of Care 2018