TYPES OF DIABETES
Causes, Identification, & More

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CLASSIFICATION of Diabetes

1. Type 1 diabetes
   - due to autoimmune b-cell destruction, leading to absolute insulin deficiency

2. Type 2 diabetes
   - due to a progressive loss of b-cell insulin secretion, frequently on the background of insulin resistance

3. Gestational diabetes mellitus (GDM)
   - diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation

4. Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes
   - such as neonatal diabetes and maturity-onset diabetes of the young [MODY]), diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced diabetes such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation

CDC

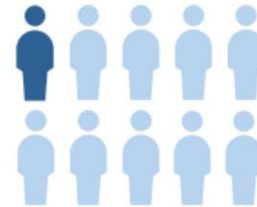CDC

COMMON TYPES OF DIABETES

TYPE 1 Body doesn't make enough insulin

Can develop at any age

No known way to prevent it

5-10% In adults, type 1 diabetes accounts for approximately **5-10%** of all diagnosed cases of diabetes.

18,000 Just over 18,000 youth **diagnosed each year** in 2017 and 2018

TYPE 2 Body can't use insulin properly

Can develop at any age

Most cases **can be prevented**

90-95% In adults, type 2 diabetes accounts for approximately **90-95%** of all diagnosed cases of diabetes.

nearly **5,300** Nearly 5,300 youth **diagnosed each year** in 2017 and 2018

Risk factors for type 2 diabetes:

Being overweight

Having a family history

Being physically inactive

Being 45 or older

1.2 Million People **18 years or older** diagnosed with diabetes in 2021

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Statistics About Diabetes in the US

- **Deaths**

  ➢ Diabetes was the ~~seventh~~ eight leading cause of death in the United States

Diabetes by Race/Ethnicity

The rates of diagnosed diabetes in adults by race/ethnic background are:

- 13.6% of American Indians/Alaskan Native adults

- 12.1% of non-Hispanic black adults

- 11.7% of Hispanic adults

- 9.1% of Asian American adults

- 6.9% of non-Hispanic white adults

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American Diabetes Association®

Connected for Life

The Burden of Diabetes in Louisiana

2021

Diabetes is an epidemic in the United States. According to the Centers for Disease Control and Prevention (CDC), over 37 million Americans have diabetes and face its devastating consequences. What's true nationwide is also true in Louisiana.

Louisiana's diabetes epidemic:

- Approximately **505,468 people in Louisiana**, or 14.2% of the adult population, **have diagnosed diabetes**.

- An additional **113,000 people in Louisiana have diabetes but don't know it**, greatly increasing their health risk.

- There are **1,243,000 people in Louisiana**, 34.4% of the adult population, who have **prediabetes** with blood glucose levels that are higher than normal but not yet high enough to be diagnosed as diabetes.

- **Every year** an estimated **27,282 people in Louisiana** are diagnosed with diabetes.

Diagnosed diabetes costs an estimated $5.7 billion Louisiana each year.

The serious complications include heart disease, stroke, amputation, end-stage kidney disease, blindness—and death.
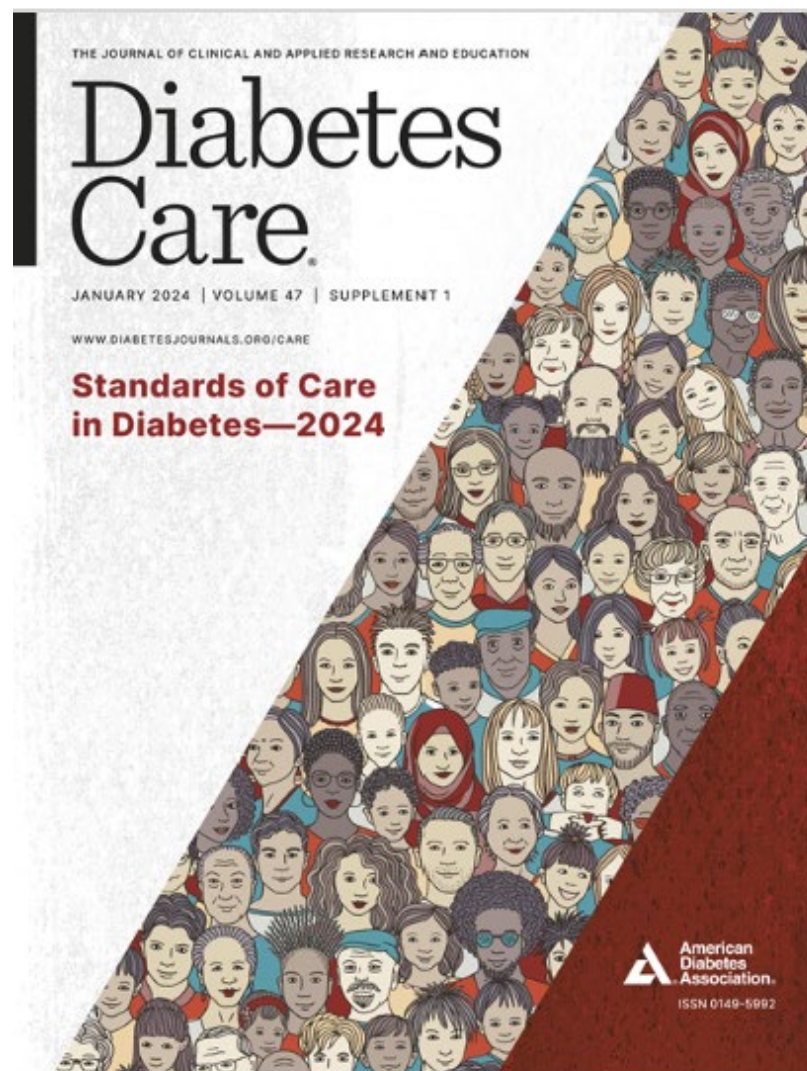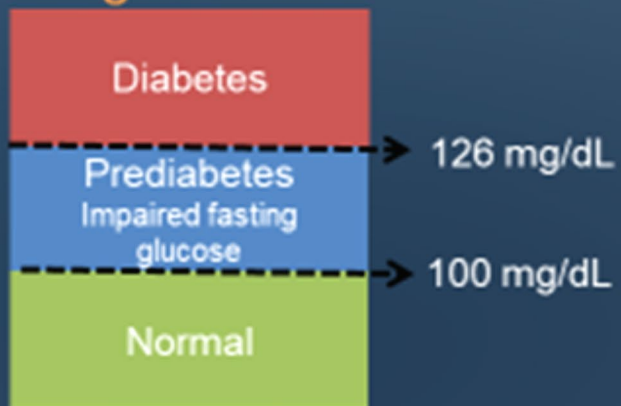
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January 2024

2024 ADA Standards of Care

Table 2.1—Criteria for the diagnosis of diabetes in nonpregnant individuals

A1C ≥6.5% (≥48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

OR

FPG ≥126 mg/dL (≥7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*

OR

2-h PG ≥200 mg/dL (≥11.1 mmol/L) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR
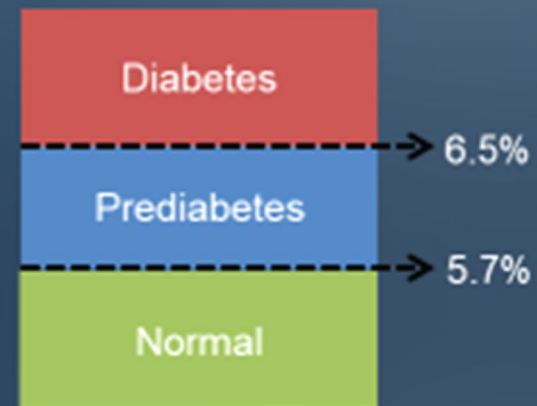
In an individual with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (≥11.1 mmol/L). Random is any time of the day without regard to time since previous meal.

DCCT, Diabetes Control and Complications Trial; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; NGSP, National Glycohemoglobin Standardization Program; WHO, World Health Organization; 2-h PG, 2-h plasma glucose. *In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results obtained at the same time (e.g., A1C and FPG) or at two different time points.

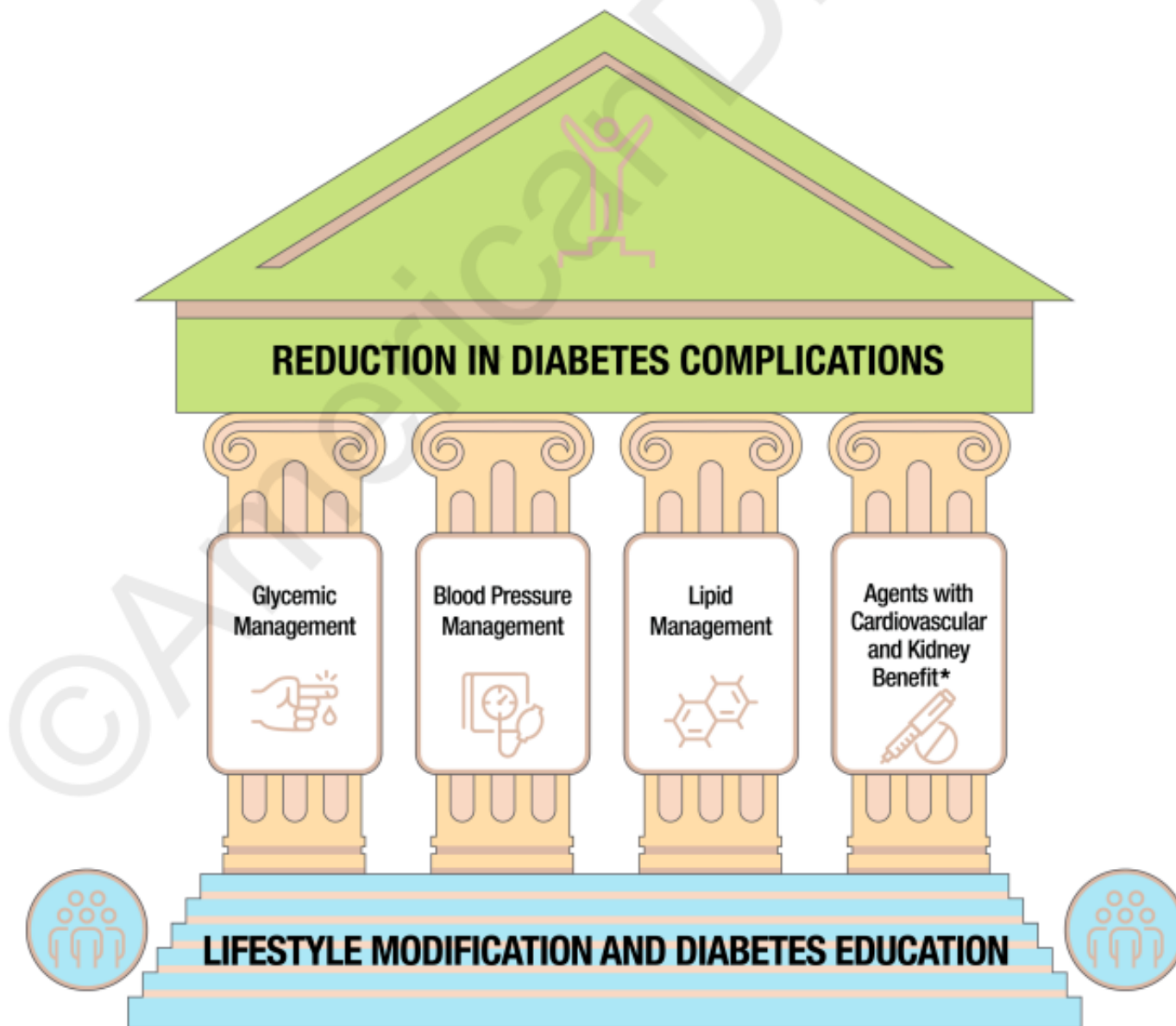**Figure 10.1**—Multifactorial approach to reduction in risk of diabetes complications. *Risk reduction interventions to be applied as individually appropriate.

Common Comorbidities

- Cancer
- Cognitive Impairment/ Dementia
- Fatty Liver Disease
- Pancreatitis
- Fractures
- Hearing Impairment

- HIV
- Low Testosterone (Men)
- Obstructive Sleep Apnea
- Periodontal Disease
- Psychosocial/Emotional Disorders

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Taking Care of Diabetes Complications
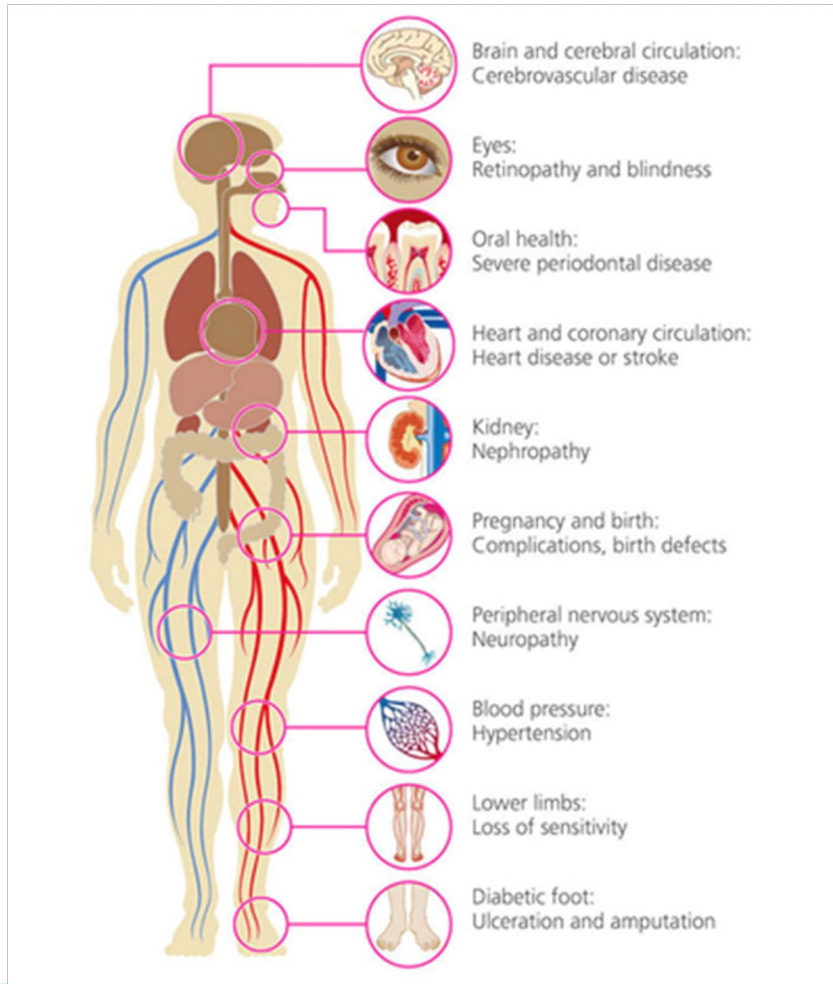
• Eye care professional for annual dilated eye exam
• Family planning for women of reproductive age
• Registered dietitian for MNT
• DSMES
• Dentist for comprehensive dental and periodontal examination
• Mental health professional, if indicated

*2024 New emphasis on the evaluation and treatment **of bone health** and added attention to diabetes-specific risk factors for fracture.

*2024 New screening recommendations for **heart failure** in people with diabetes.

PROFILES OF ANTIHYPERGLYCEMIC MEDICATIONS

		MET	GLP-1 RA	DUAL GIP/GLP-1 RA	SGLT2i	TZD	INSULIN (basal & basal bolus)	DPP-4i	SU	GLN	AGi	COLSVL	BRC	PRAML
EFFICACY FOR GLUCOSE LOWERING		++	+++	+++	++	++	+++/++++	+	++	•	•	•	•	•
ASCVD	MACE	Neutral	Benefit[1,3]	Safe	Benefit[2]	Neutral[3]	Neutral	Neutral	Possible Increased Risk	Neutral	Insufficient Evidence	Neutral[3]	Safe	Insufficient Evidence
	CHF		Unclear		Reduced Risk	Moderate to Severe[4]	Moderate	Moderate[4]						
	STROKE		Benefit[5]		Possible Benefit[2]	Benefit	Neutral	Neutral						
CKD		CKD3a/3b[6]	Benefit[7]	Insufficient Evidence	Benefit	Neutral	Increased hypoglycemia risk with impaired renal function	Neutral	Increased hypoglycemia risk with impaired renal function	Not recommended SCR >2 mg/dL or CrCl <25		Neutral	Neutral	Neutral
RENAL ADJUSTMENT		Not with CKD4 eGFR <30[6]	Exenatide not recommended eGFR <45		Check medication-specific eGFR thresholds[8]			Adjust Dose[9]						
HYPOGLYCEMIA RISK[14]		Neutral	Neutral	Neutral	Neutral	Neutral	Moderate to Severe	Neutral	Moderate to Severe	Mild	Neutral	Neutral	Neutral	Neutral
WEIGHT		Slight loss	Loss	Loss	Loss	Gain[4]	Gain	Neutral	Gain	Neutral	Neutral	Neutral	Neutral	Loss
NAFLD		Neutral	Benefit	Benefit	Potential Benefit	Benefit	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Benefit
GI ADVERSE SYMPTOMS		Mild to Moderate	Moderate[10]	Moderate[10]	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Moderate	Mild	Moderate	Moderate
OTHER CONSIDERATIONS			Medullary Thyroid Carcinoma/MEN2	Medullary Thyroid Carcinoma/MEN2	GU infections DKA[11] Fracture Risk[12]	Fracture Risk		Rare Arthralgias/Myalgias						
ACCESS/COST		$	$$$	$$$	$$$	$	$ - $$$[13]	$-$$	$	$-$$	$-$$	$$$	$$$	$$$

■ Possible benefits   ■ Use with caution   ■ Likelihood of adverse events   ■ Neutral, not studied, insufficient evidence

[1]GLP-1 RA MACE benefits with liraglutide, semaglutide, dulaglutide. [2]SGLT2i MACE benefits with empagliflozin, canagliflozin. Possible benefit for hemorrhagic stroke. [3]GLP-1 RA, TZD, COLSVL can lower LDL. [4]TZDs increase fluid retention and edema and are contraindicated in persons with NYHA Class III/IV CHF. There is Increased risk of hospitalization for CHF with saxagliptin, and limited experience for persons with NYHA Class II/IV CHF with alogliptin [5]GLP-1 RA stroke benefits observed with semaglutide and dulaglutide. [6]CKD3a no adjustment with monitoring, CKD3b decrease dose and do not initiate, CKD4 contraindicated. Hold for acute kidney injury, IV contrast. [7]Dulaglutide, semaglutide decrease CKD progression. [8]The eGFR thresholds for initiation and/or continuation of therapy in CKD vary among SGLT2i. Check medication-specific eGFR levels. [9]Only linagliptin does not require adjustment. [10]Slow titration, portion control, and consider reducing to prior tolerated dose. [11]Precipitants include significant current illness, surgery, inappropriate or rapid insulin dose reduction. [12]Reported with canagliflozin, dapagliflozin. [13]Cost varies widely with devices

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Standards of Care in Diabetes—2023 Abridged for Primary Care Providers ⊘

American Diabetes Association

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The American Diabetes Association's (ADA's) Standards of Care in Diabetes is updated and published annually in a supplement to the January issue of Diabetes Care. The Standards of Care is developed by the ADA's multidisciplinary Professional Practice Committee, which comprises expert diabetes health care professionals (HCPs). It includes the most current evidence-based recommendations for diagnosing and treating adults and children with all forms of diabetes.

Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) ⊘

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USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF TYPE 2 DIABETES

TO AVOID THERAPEUTIC INERTIA REASSESS AND MODIFY TREATMENT REGULARLY (3–6 MONTHS)

HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES); SOCIAL DETERMINANTS OF HEALTH (SDOH)

Goal: Cardiorenal Risk Reduction in High-Risk Patients with Type 2 Diabetes (in addition to comprehensive CV risk management)*

+ASCVD†
Defined differently across CVOTs but all included individuals with established CVD (e.g., MI, stroke, any revascularization procedure). Variably included: conditions such as transient ischemic attack, unstable angina, amputation, symptomatic or asymptomatic coronary artery disease.

+Indicators of high risk
While definitions vary, most comprise ≥55 years of age with two or more additional risk factors (including obesity, hypertension, smoking, dyslipidemia, or albuminuria)

+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF

+CKD
eGFR <60 mL/min per 1.73 m² OR albuminuria (ACR ≥3.0 mg/mmol [30mg/g]). These measurements may vary over time; thus, a repeat measure is required to document CKD.

+HF
SGLT2i§ with proven HF benefit in this population

+CKD (on maximally tolerated dose of ACEi/ARB)

PREFERABLY
SGLT2iᵝ with primary evidence of reducing CKD progression
Use SGLT2i in people with an eGFR ≥20 mL/min per 1.73 m²; once initiated should be continued until initiation of dialysis or transplantation
— — — OR — — — —
GLP-1 RA with proven CVD benefit if SGLT2i not tolerated or contraindicated

If HbA₁c above target, for patients on SGLT2i, consider incorporating a GLP-1 RA or vice versa

+ASCVD/Indicators of High Risk

GLP-1 RA⁴ with proven CVD benefit — EITHER/ OR — SGLT2i§ with proven CVD benefit

If HbA₁c above target

- For patients on a GLP-1 RA consider adding SGLT2i with proven CVD benefit or vice versa
- TZD^

If additional cardiorenal risk reduction or glycemic lowering needed

Goal: Achievement and Maintenance of Glycemic and Weight Management Goals

Glycemic Management: Choose approaches that provide the efficacy to achieve goals:
Metformin OR Agent(s) including COMBINATION therapy that provide adequate EFFICACY to achieve and maintain treatment goals
Consider avoidance of hypoglycemia a priority in high-risk individuals

In general, higher efficacy approaches have greater likelihood of achieving glycemic goals
Efficacy for glucose lowering
Very High:
Dulaglutide (high dose), Semaglutide, Tirzepatide
Insulin
Combination Oral, Combination Injectable (GLP-1 RA/Insulin)
High:
GLP-1 RA (not listed above), Metformin, SGLT2i, Sulfonylurea, TZD
Intermediate:
DPP-4i

Achievement and Maintenance of Weight Management Goals:
Set individualized weight management goals

| General lifestyle advice: medical nutrition therapy/eating patterns/ physical activity | Intensive evidence-based structured weight management program |
| Consider medication for weight loss | Consider metabolic surgery |

When choosing glucose-lowering therapies:
Consider regimen with high-to-very-high dual glucose and weight efficacy

Efficacy for weight loss
Very High:
Semaglutide, Tirzepatide
High:
Dulaglutide, Liraglutide
Intermediate:
GLP-1RA (not listed above), SGLT2i
Neutral:
DPP-4i, Metformin

If HbA₁c above target

Identify barriers to goals:
- Consider DSMES referral to support self-efficacy in achievement of goals
- Consider technology (e.g., diagnostic CGM) to identify therapeutic gaps and tailor therapy
- Identify and address SDOH that impact achievement of goals

* In people with HF, CKD, established CVD or multiple risk factors for CVD, the decision to use a GLP-1 RA or SGLT2i with proven benefit should be independent of background use of metformin;† A strong recommendation is warranted for people with CVD and a weaker recommendation for those with indicators of high CV risk. Moreover, a higher absolute risk reduction and thus lower numbers needed to treat are seen at higher levels of baseline risk and should be factored into the shared decision-making process. See text for details; ^ Low-dose TZD may be better tolerated and similarly effective; § For SGLT2i, CV/ renal outcomes trials demonstrate their efficacy in reducing the risk of composite MACE, CV death, all-cause mortality, MI, HHF, and renal outcomes in individuals with T2D with established/high risk of CVD; # For GLP-1 RA, CVOTs demonstrate their efficacy in reducing composite MACE, CV death, all-cause mortality, MI, stroke, and renal endpoints in individuals with T2D with established/high risk of CVD.
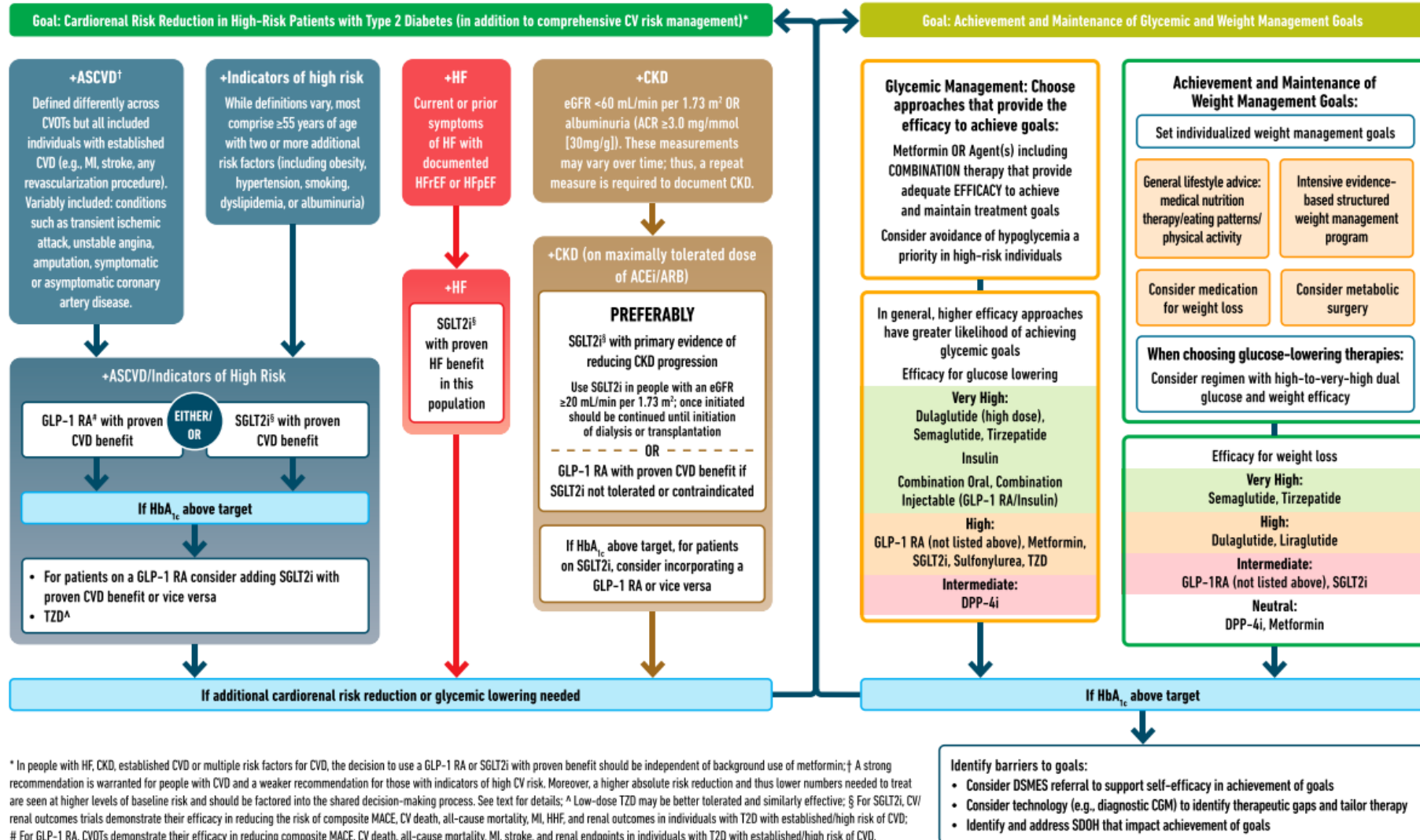
Figure 3—Use of glucose-lowering medications in the management of type 2 diabetes. ACEi, angiotensin-converting enzyme inhibitor; ACR, albumin/creatinine ratio; ARB, angiotensin receptor blocke[r], atherosclerotic cardiovascular disease; CGM, continuous glucose monitoring; CKD, chronic kidney disease; CV, cardiovascular; CVD, cardiovascular disease; CVOT, cardiovascular outcomes trial; DPP-[4], tidyl peptidase 4 inhibitor; eGFR, estimated glomerular filtration rate; GLP-1 RA, glucagon-like peptide 1 receptor agonist; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HF[, heart] failure with reduced ejection fraction; HHF, hospitalization for heart failure; MACE, major adverse cardiovascular events; MI, myocardial infarction; SDOH, social determinants of health; SGLT2i, sodium-g[lucose] transporter 2 inhibitor; T2D, type 2 diabetes; TZD, thiazolidinedione.

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Approach to the Management of Hyperglycemia

Glycemic Targets:
Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018; 41 (Suppl. 1): S55-S64
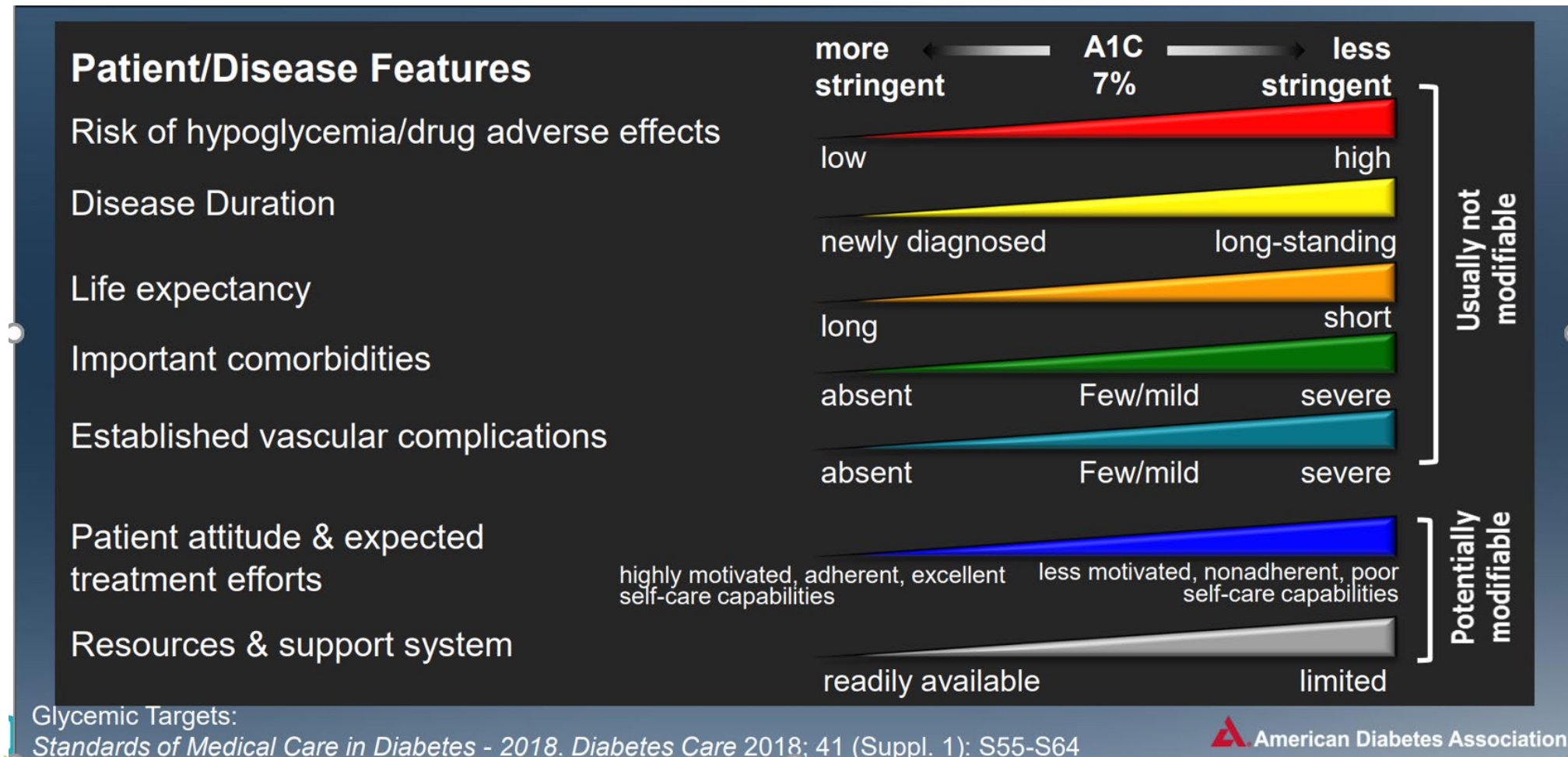
Achieving Healthy Eating Habits: *Plate Method*

Non-starchy vegetables

- Spinach
- Carrots
- Lettuce
- Greens
- Cabbage
- Green beans
- Broccoli
- Cauliflower
- Tomatoes

Grains and starchy foods

- Whole grain breads
- Sweet potatoes
- Corn
- High-fiber

Protein

- Chicken/turkey without skin
- Fish (tuna, salmon, cod, catfish)
- Tofu, eggs, low-fat cheese
- Lean beef and pork
- Beans

American Diabetes Association. Create your plate.
Available at: diabetes.org/createyourplate/