
بسم الله الرحمن الرحيم

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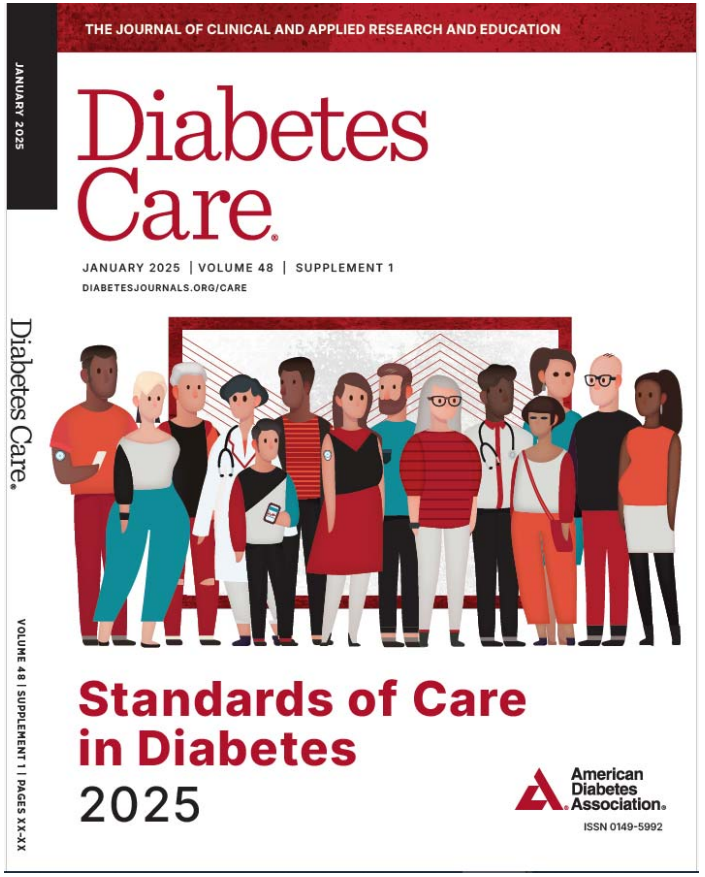
Standards of Care in Diabetes—2025

(*Standards of Care*)



American Diabetes Association.

Section 10.

Cardiovascular Disease and Risk Management

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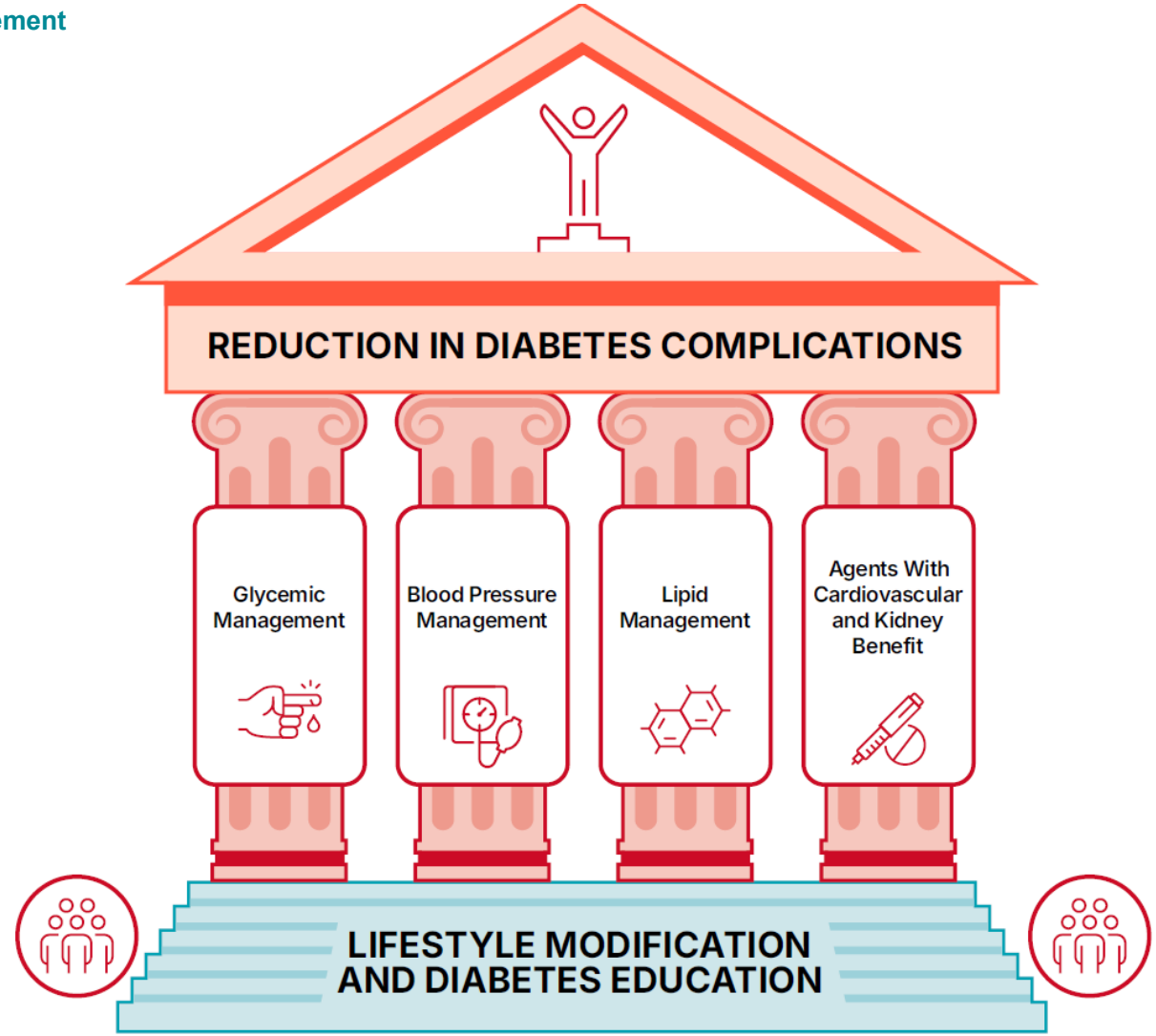


Figure 10.1—Multifactorial approach to reduction in risk of diabetes complications.

Hypertension and Blood Pressure Management – Screening and Diagnosis

10.1 Blood pressure should be measured at every routine clinical visit, or at least every 6 months. Individuals found to have elevated blood pressure without a diagnosis of hypertension (systolic blood pressure 120–129 mmHg and diastolic blood pressure <80 mmHg) should have blood pressure confirmed using multiple readings, including measurements on a separate day, to diagnose hypertension. **A**

Hypertension is defined as a systolic blood pressure ≥130 mmHg or a diastolic blood pressure ≥ 80mmHg based on an average of **two or more measurements obtained on two or more occasions. A**

Individuals with blood pressure ≥180/110 mmHg and cardiovascular disease could be diagnosed with hypertension at a single visit. **E**

10.2 Counsel all people with hypertension and diabetes to monitor their blood pressure at home after appropriate education. **A**

10.3 For people with diabetes and hypertension, blood pressure goals should be individualized through a shared decision-making process that addresses cardiovascular risk, potential adverse effects of antihypertensive medications, and individual preferences. **B**

10.4 The on-treatment blood pressure goal is <130/80 mmHg, if it can be safely attained. **A**

10.5 In pregnant individuals with diabetes and chronic hypertension, a blood pressure threshold of 140/90 mmHg for initiation or titration of therapy is associated with better pregnancy outcomes than reserving treatment for severe hypertension, with no increase in risk of small-for-gestational-age birth weight. **A**

There are limited data on the optimal lower limit, but therapy should be deintensified for blood pressure <90/60 mmHg. **E**

A blood pressure goal of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension. **A**

Recommendations for the Treatment of Confirmed Hypertension in Nonpregnant People With Diabetes

Initial BP ≥130/80 and <150/90 mmHg

Start one agent

Albuminuria or CAD*

No

Start ACEi or ARB or CCB† or diuretic‡

Yes

Start ACEi or ARB

Lifestyle management

Initial BP ≥150/90 mmHg

Start two agents

Albuminuria or CAD*

No

Start two drugs from ACEi or ARB, CCB† or diuretic‡

Yes

Start ACEi or ARB and CCB† or diuretic‡

Assess BP management and adverse effects

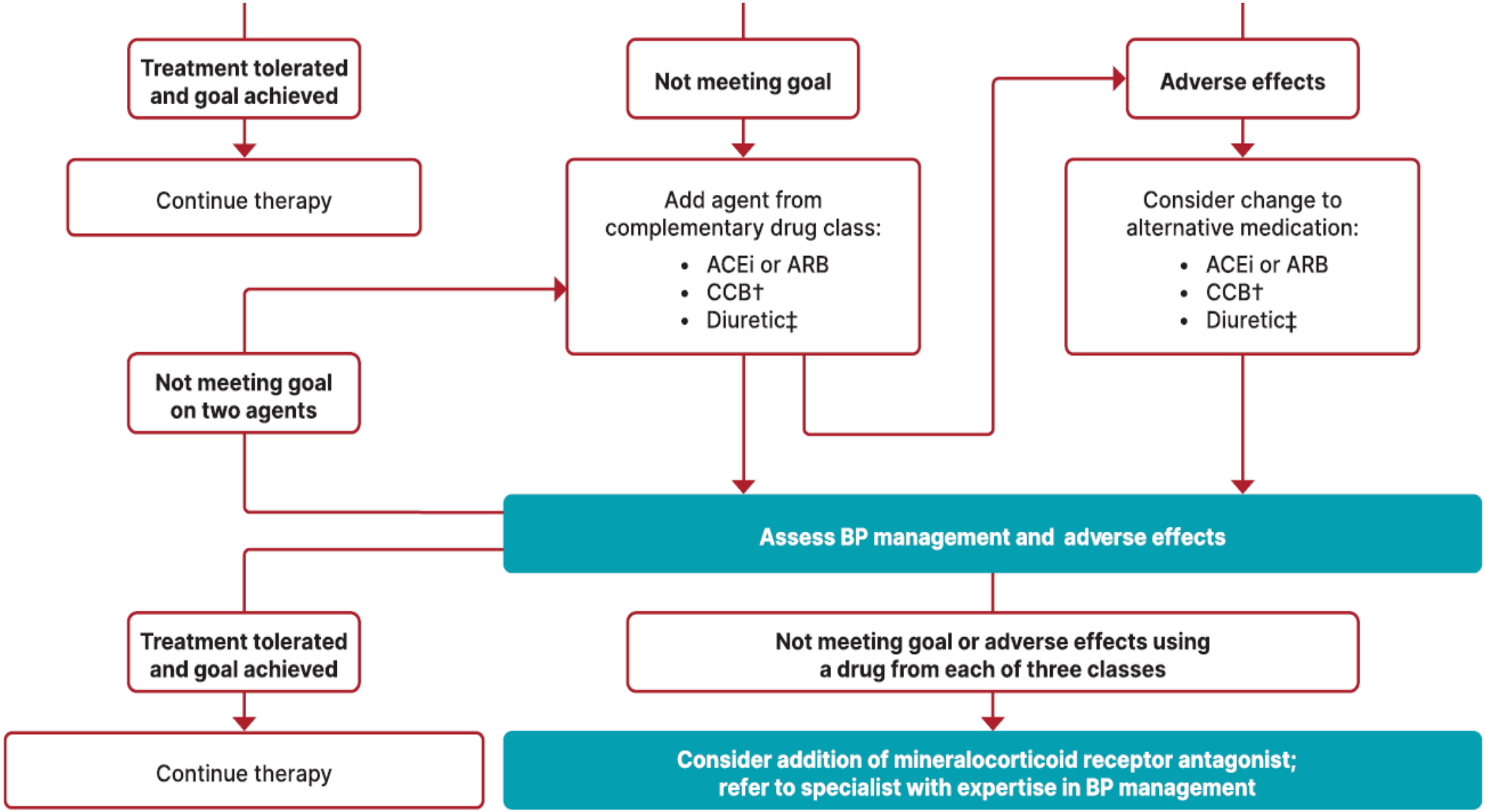

Treatment tolerated and goal achieved
Continue therapy
Not meeting goal
Add agent from complementary drug class:
• ACEi or ARB
• CCB†
• Diuretic‡
Adverse effects
Consider change to alternative medication:
• ACEi or ARB
• CCB†
• Diuretic‡
Not meeting goal on two agents
Assess BP management and adverse effects
Treatment tolerated and goal achieved
Continue therapy
Not meeting goal or adverse effects using a drug from each of three classes
Consider addition of mineralocorticoid receptor antagonist; refer to specialist with expertise in BP management

Figure 10.2—Recommendations for the treatment of confirmed hypertension in nonpregnant people with diabetes. *An ACE inhibitor (ACEi) or angiotensin receptor blocker (ARB) is suggested for the treatment of hypertension in people with coronary artery disease (CAD) or urine albumin-to-creatinine ratio 30–299 mg/g creatinine and is strongly recommended for individuals with urine albumin-to-creatinine ratio ≥300 mg/g creatinine. †Dihydropyridine calcium channel blocker (CCB). ‡Thiazide-like diuretic; long-acting agents shown to reduce cardiovascular events, such as chlorthalidone and indapamide, are preferred. BP, blood pressure. Adapted from de Boer et al. (21).

10.6 For people with blood pressure >120/80 mmHg,

lifestyle intervention consists of weight loss when indicated,

a Dietary Approaches to Stop Hypertension (DASH)-style eating pattern including reducing sodium and increasing potassium intake,

moderation of alcohol intake,

smoking cessation,

and increased physical activity. **A**

10.7 In individuals with confirmed office-based blood pressure ≥130/80 mmHg, pharmacologic therapy should be initiated and titrated to achieve the recommended blood pressure goal of <130/80 mmHg. **A**

10.8 Individuals with confirmed office-based blood pressure ≥ 150/90 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of two drugs or a single-pill combination of drugs demonstrated to reduce cardiovascular events in people with diabetes. **A**

10.9 Treatment for hypertension should include drug classes demonstrated to reduce cardiovascular events in people with diabetes. **A** ACE inhibitors or angiotensin receptor blockers (ARBs) are recommended first-line therapy for hypertension in people with diabetes and coronary artery disease. **A**

10.10 Multiple-drug therapy is generally required to achieve blood pressure goals. Avoid combinations of ACE inhibitors and ARBs and combinations of ACE inhibitors or ARBs (including ARBs and neprilysin inhibitors) with direct renin inhibitors. **A**

10.11 An ACE inhibitor or ARB, at the maximum tolerated dose indicated for blood pressure treatment, is the recommended first-line treatment for hypertension in people with diabetes and urinary albumin-to-creatinine ratio ≥300 mg/g creatinine **A** or 30–299 mg/g creatinine. **B** If one class is not tolerated, the other should be substituted. **B**

10.12 Monitor for increased serum creatinine and for increased serum potassium levels when ACE inhibitors, ARBs, and mineralocorticoid receptor antagonists (MRAs) are used, for hypokalemia when diuretics are used at routine visits, and 7–14 days after initiation or after a dose change. **B**

10.13 ACE inhibitors, angiotensin receptor blockers, MRAs, direct renin inhibitors, and neprilysin inhibitors should be avoided in sexually active individuals of childbearing potential who are not using reliable contraception and are contraindicated in pregnancy. **A**

10.14 Individuals with hypertension who are not meeting blood pressure goals on three classes of antihypertensive medications (including a diuretic) should be considered for MRA therapy. **A**

Lipid Management

Lifestyle Intervention

Ongoing Therapy and Monitoring with Lipid Panel

Lifestyle modification ***and optimize glycemic management*** should be recommended to improve the lipid profile and reduce the risk of developing atherosclerotic cardiovascular disease (ASCVD) in people with diabetes. **A**

weight loss (if indicated); application of a Mediterranean or DASH eating pattern; reduction of saturated fat and trans fat; increase of dietary n-3 fatty acids, viscous fiber, and plant stanol and sterol intake

increased physical activity

In adults with prediabetes or diabetes not taking statins or other lipid-lowering therapy, it is reasonable to

obtain a lipid profile at the time of diagnosis,

at initiation of statins or other lipid-lowering therapy,

4–12 weeks after initiation or a change in dose,and annually thereafter,

as it facilitates monitoring the response to therapy and informs medication-taking behavior.
A

ASCVD is defined as a history of an **acute coronary syndrome or myocardial infarction, stable or unstable angina, coronary heart disease with or without revascularization,other arterial revascularization, stroke, or peripheral artery disease assumed to be atherosclerotic in origin.**

Individuals at high risk for ASCVD include **those with end-organ damage such as left ventricular hypertrophy or retinopathy or with multiple CV risk factors (hypertension, smoking, dyslipidemia, and obesity).**

Statin Treatment (Primary Prevention)

For people with diabetes aged 40–75 years

without ASCVD, use moderate-intensity statin therapy in addition to lifestyle therapy. **A**

at higher cardiovascular risk, including those with one or more additional ASCVD risk factors, high-intensity statin therapy is recommended to reduce LDL cholesterol by ≥50% of baseline and to obtain an LDL cholesterol goal of <70 mg/dL . **A**

and an LDL cholesterol ≥70 mg/dL, it may be reasonable to add ezetimibe or a PCSK9 inhibitor to maximum tolerated statin therapy. **B**

Ezetimibe lowers LDL by 14% to 25% when used alone or in combination with statins.

PCSK9 Inhibitors lowers LDL by 60 % when used alone or in combination with statins

In people with diabetes intolerant to statin therapy,

treatment with bempedoic acid is recommended to reduce cardiovascular event rates as an alternative cholesterol-lowering plan. A

Bempedoic acid

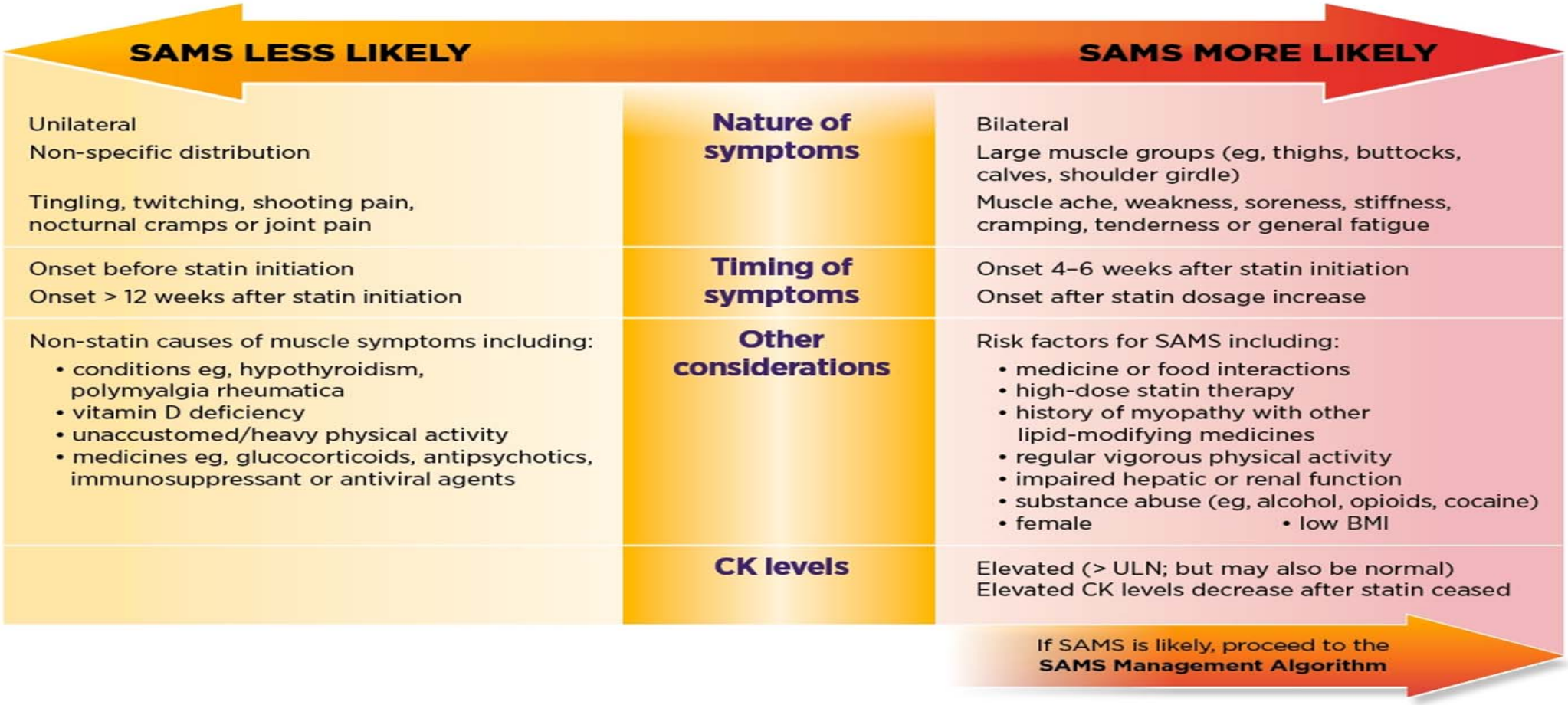
a novel LDL cholesterol lowering agent acting in the same pathway as statin but without activity in skeletal muscle, which limits the muscle-related adverse effects, lowers LDL cholesterol levels by 15% for those on statins and 24% for those not taking statins

For individuals requiring primary prevention, the use of bempedoic acid resulted in a 30% reduction in primary composite outcome compared with placebo

Bempedoic acid may lead to a

decrease in hemoglobin
increases in blood urea nitrogen, creatinine,
uric acid; and an increase in gout.

SAMS Assessment Guide



Managing the Patient with Potential Statin-Associated Muscle Symptoms (SAMS)

Reassess the benefit of statin therapy	• Calculate atherosclerotic vascular disease risk • Assess patient preference • Consider factors such as physical activity and other medications that may impact SAMS
Evaluate and confirm diagnosis	• Assess symptoms for typical clinical features • Dechallenge and rechallenge with ≥2 statins • Measure timing of symptom resolution and reemergence
Eliminate contributing factors	• Hypothyroidism • Vitamin D status (insufficiency) • Other medications, muscle diseases and conditions
Reassure the patient	• Discuss nocebo effect, reversibility of SAMS, long-term safety and efficacy of statins, and stability vs. progression of symptoms
Try alternative statins and doses	• Consider statins such as atorvastatin and rosuvastatin with longer half-lives • Alternate day or even less dosing strategies
Prescribe alternative treatment strategies	• Low-dose statins in combination with ezetimibe • Proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors • Other non-statin lipid lowering therapies

In adults with diabetes aged >75 years

already on statin therapy, it is reasonable to continue statin treatment. **B**

aged >75 years, it may be reasonable to initiate moderate-intensity statin therapy after discussion of potential benefits and risks. **C**

For people with diabetes **aged 20–39 years with additional ASCVD risk factors**, it may be reasonable to initiate statin therapy in addition to lifestyle therapy. **C**

lipid-lowering agents should be stopped prior to conception B

Lipid Management for Primary Prevention of Atherosclerotic Cardiovascular Disease Events in People With Diabetes in Addition to Healthy Behavior Modification

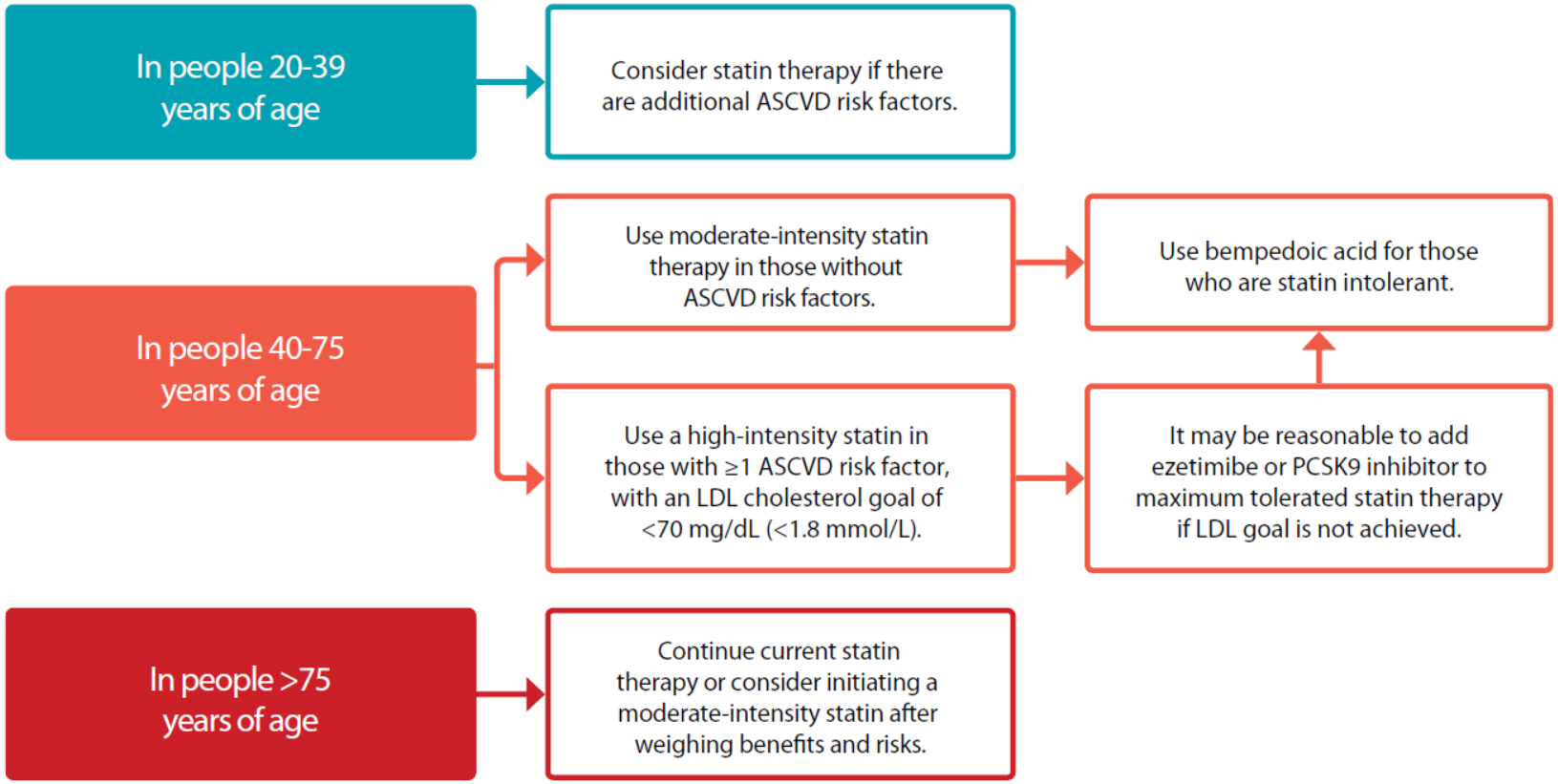


Figure 10.3—Recommendations for primary prevention of atherosclerotic cardiovascular disease (ASCVD) in people with diabetes using cholesterol-lowering therapy. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).

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Statin Treatment (Secondary Prevention)

For people of all ages with diabetes and ASCVD,

high-intensity statin therapy should be added to lifestyle therapy. **A**

treatment with high-intensity statin therapy is recommended to obtain an LDL cholesterol reduction of ≥50% from baseline and an LDL cholesterol goal of <55 mg/dL.

Addition of ezetimibe or a PCSK9 inhibitor with proven benefit in this population is recommended if this goal is not achieved on maximum tolerated statin therapy. B

For individuals who do not tolerate the intended statin intensity, the maximum tolerated statin dose should be used. **E**

For people with diabetes and ASCVD intolerant to statin therapy,

PCSK9 inhibitor therapy with monoclonal antibody treatment, **A**

bempedoic acid therapy, **A**

PCSK9 inhibitor therapy with inclisiran siRNA **E**

should be considered as an alternative cholesterol-lowering therapy.

PCSK9 Inhibitors

Mechanism :Prevent degradation of the LDL receptor

Evolocumab	140 mg sc q 2 weeks or 420 mg sc q month
Alirocumab	75-150 mg sc q 2 weeks
Inclisiran	284 mg q6m

Bempedoic Acid 180 mg qd

Decrease cholesterol synthesis; increase LDL receptor-mediated removal of LDL

Ezetimibe 10 mg qd

Inhibits cholesterol absorption

Lipid Management for Secondary Prevention of Atherosclerotic Cardiovascular Disease Events in People With Diabetes

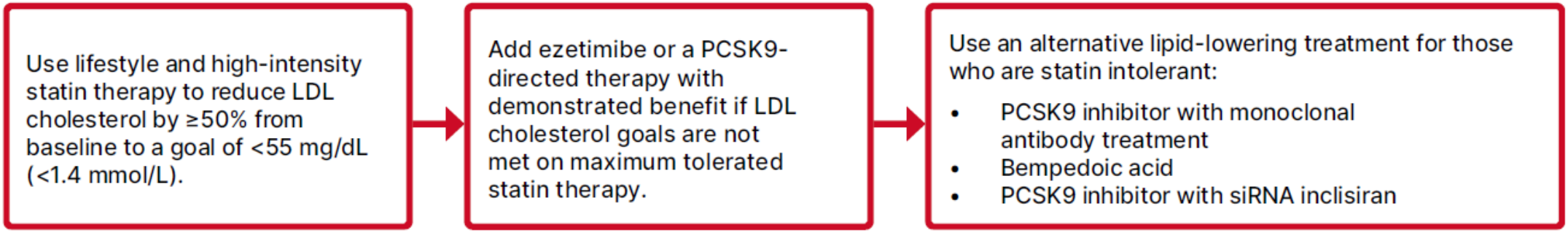

Figure 10.4—Recommendations for secondary prevention of atherosclerotic cardiovascular disease (ASCVD) in people with diabetes using cholesterol-lowering therapy. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).

Table 10.1—High-intensity and moderate-intensity statin therapy

High-intensity statin therapy (lowers LDL cholesterol by ≥50%)	Moderate-intensity statin therapy (lowers LDL cholesterol by 30–49%)
Atorvastatin 40–80 mg	Atorvastatin 10–20 mg
Rosuvastatin 20–40 mg	Rosuvastatin 5–10 mg
	Simvastatin 20–40 mg
	Pravastatin 40–80 mg
	Lovastatin 40 mg
	Fluvastatin XL 80 mg
	Pitavastatin 1–4 mg

Once-daily dosing. XL, extended release.

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Treatment of Other Lipoprotein Fractions or Goals

In adults with **hypertriglyceridemia (fasting triglycerides >150 mg/dL or nonfasting triglycerides >175mg/dL),** clinicians should address and treat lifestyle factors **(obesity and metabolic syndrome),** secondary factors **(diabetes, chronic liver or kidney disease and/or nephrotic syndrome, and hypothyroidism),** and medications that raise triglycerides. **C**

For individuals **with fasting triglyceride levels ≥500mg/dL** , evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis. **C**

Severe hypertriglyceridemia (fasting triglycerides 500 mg/dL and especially >1,000 mg/dL) may warrant pharmacologic therapy (fibric acid derivatives) and reduction in dietary fat to reduce the risk of acute pancreatitis .

In individuals **with ASCVD or other cardiovascular risk factors** on a statin with managed LDL cholesterol **but elevated triglycerides (150–499 mg/dL),** the addition of icosapent ethyl can be considered to reduce cardiovascular risk. **B**

Other Combination Therapy

Statin plus fibrate combination therapy **has not been shown to improve ASCVD outcomes and is generally not recommended. A**

Statin plus niacin combination therapy **has not been shown to provide additional cardiovascular benefit above statin therapy alone,** may increase the risk of stroke with additional side effects, and is generally not recommended. **A**

Antiplatelet Agents

10.35 Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of ASCVD. **A**

10.36a For individuals with ASCVD and documented aspirin allergy, clopidogrel (75 mg/day) should be used. **B**

10.36b The length of treatment with dual antiplatelet therapy using low-dose aspirin and a P2Y12 inhibitor in individuals with diabetes after an acute coronary syndrome, acute ischemic stroke, or transient ischemic attack should be determined by an interprofessional team approach that includes a cardiovascular or neurological specialist, respectively. **E**

10.37 Combination therapy with aspirin plus low-dose rivaroxaban should be considered for individuals with stable coronary and/or peripheral artery disease (PAD) and low bleeding risk to prevent major adverse limb and cardiovascular events. **A**

10.38 Aspirin therapy (75–162 mg/day) may be considered as a primary prevention strategy in those with diabetes who are at increased cardiovascular risk after a comprehensive discussion with the individual on the benefits versus the comparable increased risk of bleeding. **A**

Cardiovascular Disease – Screening

10.39a In asymptomatic individuals, routine screening for coronary artery disease is not recommended, as it does not improve outcomes as long as ASCVD risk factors are treated. **A**

10.39b Consider investigations for coronary artery disease in the presence of any of the following: signs or symptoms of cardiac or associated vascular disease, including carotid bruits, transient ischemic attack, stroke, claudication, or PAD; or electrocardiogram abnormalities (e.g., Q waves). **E**

10.40a Adults with diabetes are at increased risk for the development of asymptomatic cardiac structural or functional abnormalities (stage B heart failure) or symptomatic (stage C) heart failure.

Consider screening adults with diabetes by measuring a natriuretic peptide (B-type natriuretic peptide [BNP] or N-terminal pro-BNP [NT-proBNP]) to facilitate prevention of stage C heart failure. **B**

10.40b In asymptomatic individuals with diabetes and abnormal natriuretic peptide levels, **echocardiography is recommended to identify stage B heart failure. A**

10.41 In asymptomatic individuals with diabetes and age ≥65 years, microvascular disease in any location, or foot complications or any end-organ damage from diabetes, screening for PAD with ankle-brachial index testing is recommended if a PAD diagnosis would change management. **B**

In individuals with diabetes duration ≥10 years and high cardiovascular risk, screening for PAD should be considered. **E**

Screening for Undiagnosed Cardiovascular Disease

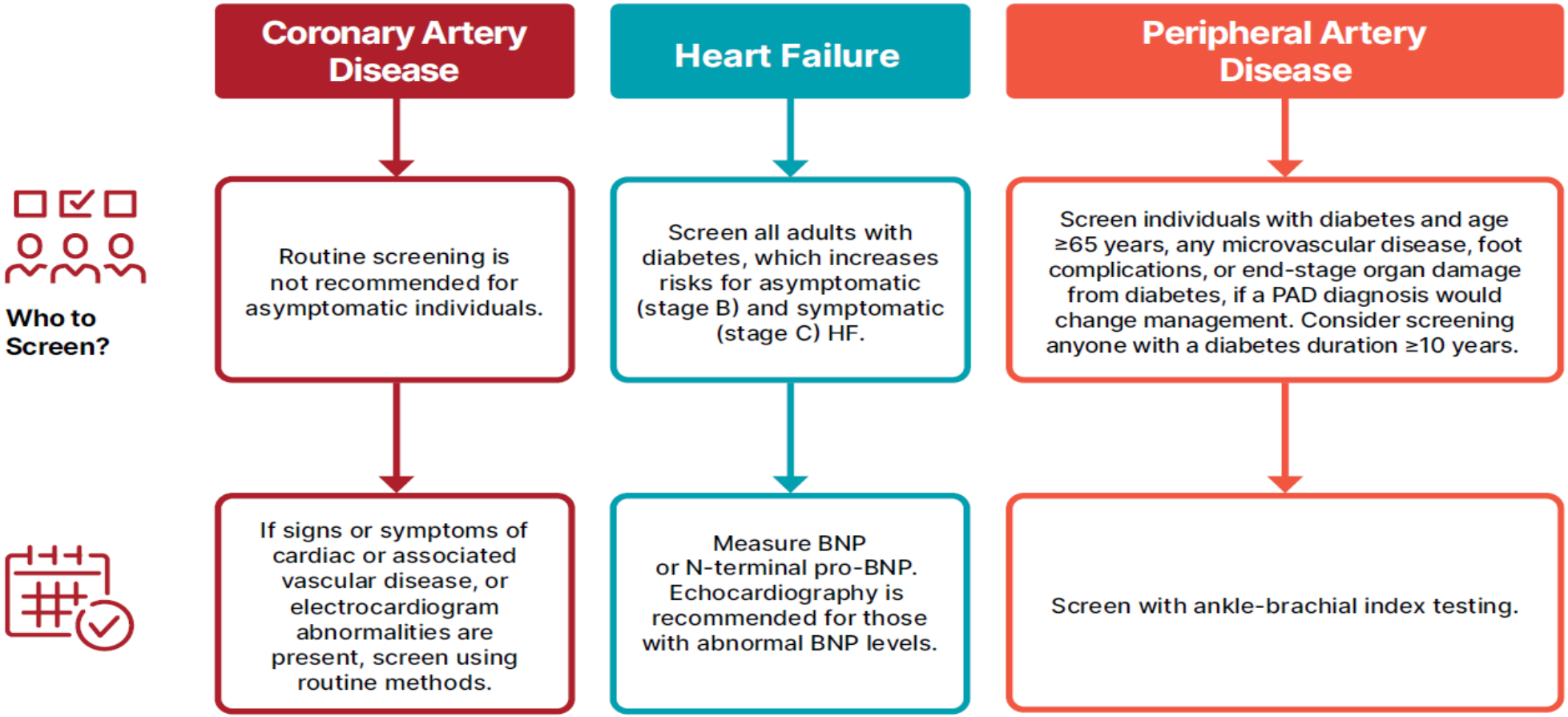


Figure 10.5—Recommendations for screening of asymptomatic and undiagnosed cardiovascular disease. BNP, B-type natriuretic peptide; HF, heart failure; PAD, peripheral artery disease. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).

Cardiovascular Disease – Treatment

10.42 Among people with type 2 diabetes who have established ASCVD or established kidney disease, a sodium–glucose cotransporter 2 (SGLT2) inhibitor or glucagon-like peptide 1 (GLP-1) receptor agonist (RA) with demonstrated cardiovascular disease benefit is recommended as part of the comprehensive cardiovascular risk reduction and/or glucose-lowering treatment plans. **A**

10.42a In people with type 2 diabetes and established ASCVD, multiple ASCVD risk factors, or chronic kidney disease (CKD), an SGLT2 inhibitor with demonstrated cardiovascular benefit is recommended to reduce the risk of major adverse cardiovascular events and/or heart failure hospitalization. **A**

10.42b In people with type 2 diabetes and established ASCVD or multiple risk factors for ASCVD, a GLP-1 RA with demonstrated cardiovascular benefit is recommended to reduce the risk of major adverse cardiovascular events. **A**

10.42c In people with type 2 diabetes and established ASCVD or multiple risk factors for ASCVD, combined therapy with an SGLT2 inhibitor with demonstrated cardiovascular benefit and a GLP-1 RA with demonstrated cardiovascular benefit may be considered for additive reduction of the risk of adverse cardiovascular and kidney events. **A**

10.43a In people with type 2 diabetes and established heart failure with either preserved or reduced ejection fraction, an SGLT2 inhibitor (including SGLT1/2 inhibitor) with proven benefit in this population is recommended to reduce the risk of worsening heart failure and cardiovascular death. **A**

10.43b In people with type 2 diabetes and established heart failure with either preserved or reduced ejection fraction, an SGLT2 inhibitor with proven benefit in this population is recommended to improve symptoms, physical limitations, and quality of life. **A**

10.44 For individuals with type 2 diabetes and CKD with albuminuria treated with maximum tolerated doses of ACE inhibitor or ARB, recommend treatment with a nonsteroidal MRA with demonstrated benefit to improve cardiovascular outcomes and reduce the risk of CKD progression. **A**

10.45 In individuals with diabetes with established ASCVD or aged ≥55 years with additional cardiovascular risk factors, ACE inhibitor or ARB therapy is recommended to reduce the risk of cardiovascular events and mortality. **A**

10.46a In individuals with diabetes and asymptomatic stage B heart failure, an interprofessional approach to optimize guideline-directed medical therapy, which should include a cardiovascular disease specialist, is recommended to reduce the risk for progression to symptomatic (stage C) heart failure. **A**

10.46b In individuals with diabetes and asymptomatic stage B heart failure, ACE inhibitors or ARBs and β-blockers are recommended to reduce the risk for progression to symptomatic (stage C) heart failure. **A**

10.46c In individuals with type 2 diabetes and asymptomatic stage B heart failure or with high risk of or established cardiovascular disease, treatment with an SGLT inhibitor with proven heart failure prevention benefit is recommended to reduce the risk of hospitalization for heart failure. **A**

10.46d In individuals with type 2 diabetes, obesity, and symptomatic heart failure with preserved ejection fraction, therapy with a GLP-1 RA with demonstrated benefit for reduction of heart failure-related symptoms, physical limitations, and exercise function is recommended. **A**

10.46e In individuals with type 2 diabetes and CKD, recommend treatment with a nonsteroidal MRA with demonstrated benefit to reduce the risk of hospitalization for heart failure. **A**

10.46f In individuals with diabetes, guideline-directed medical therapy for myocardial infarction and symptomatic stage C heart failure is recommended with ACE inhibitors or ARBs, MRAs, angiotensin receptor or neprilysin inhibitor, β-blockers, and SGLT2 inhibitors, similar to guideline-directed medical therapy for people without diabetes. **A**

10.47 In people with type 2 diabetes with stable heart failure, metformin may be continued for glucose lowering if estimated glomerular filtration rate remains >30 mL/min/1.73 m^2 but should be avoided in unstable or hospitalized individuals with heart failure. **B**

10.48 Individuals with type 1 diabetes and those with type 2 diabetes who are ketosis prone and/or follow a ketogenic eating pattern who are treated with SGLT inhibition should be educated on the risks and signs of ketoacidosis and methods of risk management and provided with appropriate tools for accurate ketone measurement (i.e., serum β-hydroxybutyrate). **E**

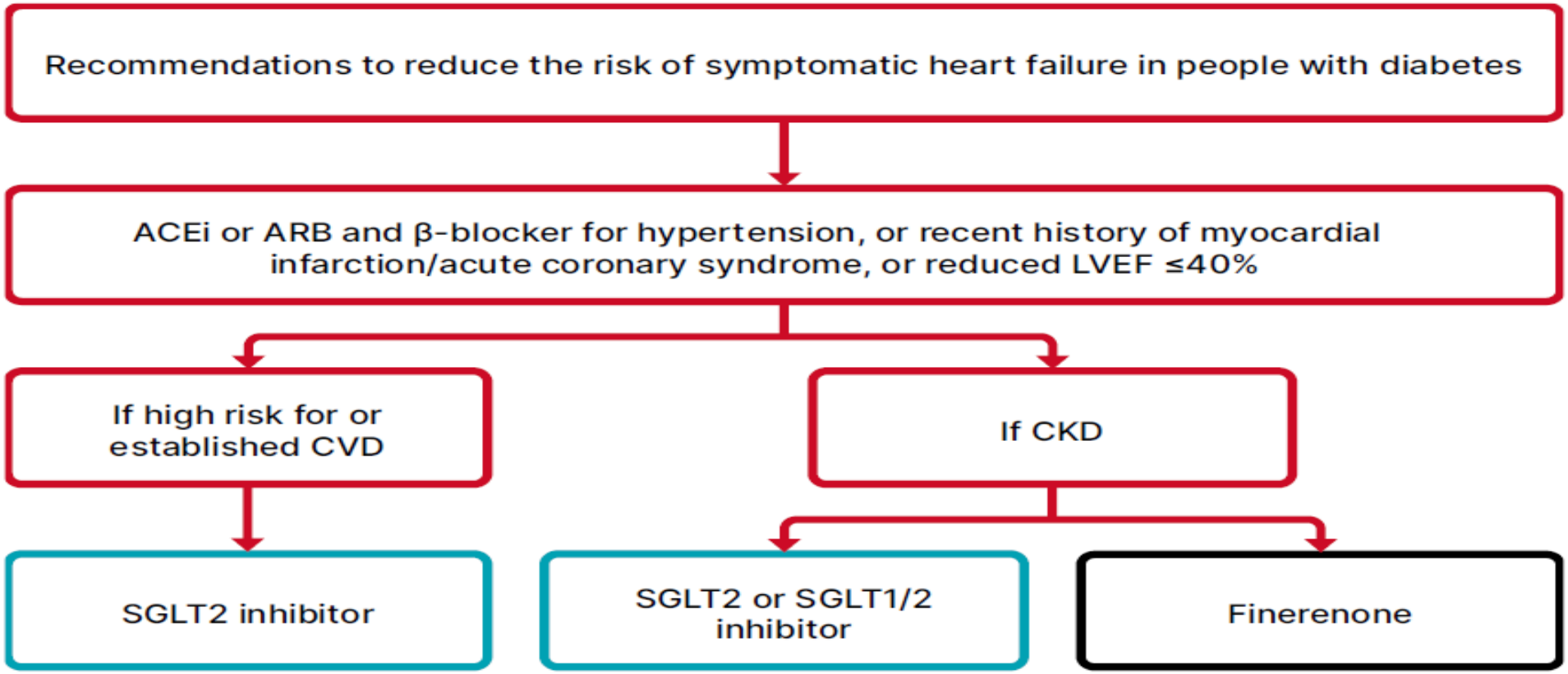
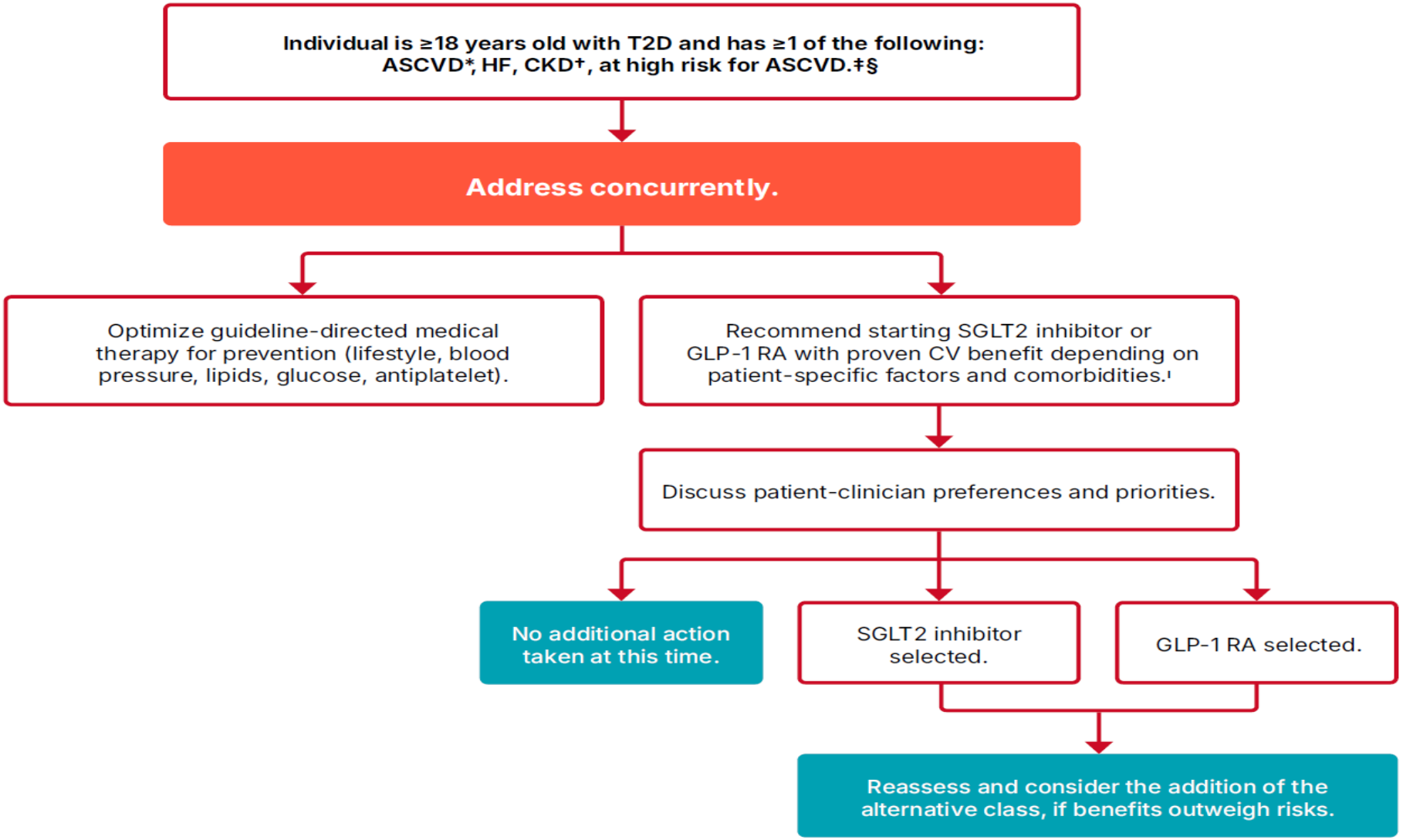


Figure 10.6—Overview of recommendations for the prevention of the development of symptomatic heart failure in people with diabetes. ACEi, ACE inhibitor; ARB, angiotensin receptor blocker; CKD, chronic kidney disease; CVD, cardiovascular disease; LVEF, left ventricle ejection fraction; SGLT2, sodium–glucose cotransporter 2. Adapted from *"Standards of Care in Diabetes—2024* Abridged for Primary Care Professionals" (325).


Individual is ≥18 years old with T2D and has ≥1 of the following: ASCVD*, HF, CKD†, at high risk for ASCVD.‡§
Address concurrently.
Optimize guideline-directed medical therapy for prevention (lifestyle, blood pressure, lipids, glucose, antiplatelet).
Recommend starting SGLT2 inhibitor or GLP-1 RA with proven CV benefit depending on patient-specific factors and comorbidities.¶
Discuss patient-clinician preferences and priorities.
No additional action taken at this time.
SGLT2 inhibitor selected.
GLP-1 RA selected.
Reassess and consider the addition of the alternative class, if benefits outweigh risks.

* ASCVD is defined as a history of an acute coronary syndrome or myocardial infarction, stable or unstable angina, coronary heart disease with or without revascularization, other arterial revascularization, stroke, or peripheral artery disease assumed to be atherosclerotic in origin.

† CKD is a clinical diagnosis marked by reduced eGFR, the presence of albuminuria, or both.

‡ Consider an SGLT2 inhibitor when the individual has established ASCVD, HF, or CKD or is at high risk for ASCVD. Consider a GLP-1 RA when the individual has established ASCVD or is at high risk for ASCVD.

§ Individuals at high risk for ASCVD include those with end-organ damage such as left ventricular hypertrophy or retinopathy or with multiple CV risk factors (e.g., age, hypertension, smoking, dyslipidemia, and obesity).

‖ Most individuals enrolled in the relevant trials were on metformin at baseline as glucose-lowering therapy.

Figure 10.7—Approach to risk reduction with sodium–glucose cotransporter 2 (SGLT2) inhibitor or glucagon-like peptide 1 receptor agonist (GLP-1 RA) therapy in conjunction with other traditional, guideline-based preventive medical therapies for blood pressure, lipids, and glycemia and anti-platelet therapy. ASCVD, atherosclerotic cardiovascular disease; CKD, chronic kidney disease; CV, cardiovascular; eGFR, estimated glomerular filtration rate; HF, heart failure; T2D, type 2 diabetes. Adapted with permission from Das et al. (324).