Achieving Cardiovascular Excellence

A Primary Care Quality Improvement Project

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Change Package

Revised 2025

OHIO COLLEGES OF MEDICINE
GOVERNMENT RESOURCE CENTER

Ohio Department of Health

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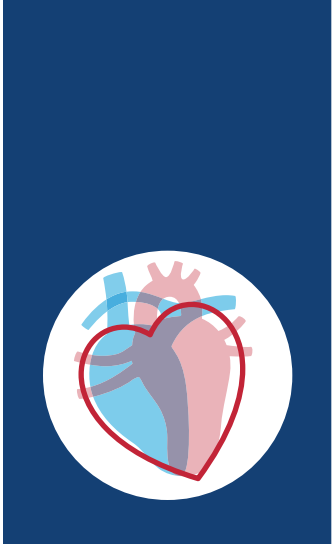


EXECUTIVE SUMMARY

Hypertension (HTN) is a major contributor to heart disease and stroke, which are among the most common, costly, and preventable health problems in the United States and Ohio.[1] Cardiovascular disease (CVD), which includes heart disease, stroke, and heart failure, is the leading cause of death in Ohio and nationwide.[2] Less than half of all patients with HTN have their blood pressure (BP) controlled to goal; clinicians partnering with patients can improve blood pressure control.[3]

Background

The recommendations in this change package reflect the 2025 AHA/ACC Guidelines for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. While the current HEDIS measures aims for a target blood pressure of less than 140/90 mmHg, meeting the goal of 130/80 mmHg will satisfy the HEDIS target as well.

- Ohio adults have a higher prevalence of heart disease (8.4%) and stroke (4.3%) compared with adults in the United States.[4]
- HTN is responsible for 33% of all cardiovascular events and 43% of heart disease in Black people.[5]
- In 2022, heart disease claimed the lives of 30,041 Ohioans.[6]
- In 2020, 10.6 and 19.3 potential years of life are lost from heart disease in White and Black people, respectively.[7]

> "Black, Hispanic, and American Indian populations experience greater disadvantage across health-related social needs (HRSN) domains compared to the White population, leading to higher CVD risks."8

Overall, men and women face similar risks for being diagnosed with CVD. However, there are significant racial disparities where non-Hispanic Black adults are more likely to die of heart disease than non-Hispanic White adults.[8] Of note, Black Americans receive a diagnosis of high BP earlier in life and their average BP levels are higher, resulting in greater rates of non-fatal stroke, fatal stroke, heart disease deaths, and end-stage kidney disease.[9,10] These cardiovascular risk factors can be addressed successfully with proper medication, HTN registries, unbiased proper BP management with cultural humility, lifestyle change, and addressing non-medical health-related social needs.[11,12]

Individuals with HTN may also have comorbidities that contribute to CVD such as high cholesterol. Refer to appendix G for cholesterol control materials.

About the Achieving Cardiovascular Excellence (ACE) project

The ACE quality improvement (QI) project seeks to 1) improve BP control across the patient population, with a specific focus on Black patients and those in Ohio's Appalachian region, 2) and foster community partnerships to address health-related social needs. The Ohio Department of Health (ODH) will collaborate with the Ohio Colleges of Medicine Government Resource Center (GRC) and The Ohio State University Wexner Medical Center to address cardiovascular risk factors and heart disease disparities. ACE practices will incorporate strategies to improve diagnosis and management of HTN, utilize electronic health records (EHR) for reporting and monitoring of clinical quality measures, and identify and address health-related social needs. QI activities will follow the Institute for Healthcare Improvement's (IHI) Model for Improvement.

KEY DRIVER: Identifying Adult Patients with Hypertension

Accurate BP measurement is a fundamental skill required for the correct HTN diagnosis and treatment.[13] Consider the following strategies to improve BP measurement and ensure consistent practice within your clinic.

1. Functional equipment available in all patient rooms.

Have a plan in place to ensure equipment is available, calibrated, and working correctly. Investing time to stock or repair equipment will minimize staff frustration, allowing them to more easily focus on technique and new workflows to ensure accurate BP measurement. When able, we suggest use of validated blood pressure cuffs and, based on literature, automated office blood pressure monitoring.[14] A resource for validated BP monitors can be found at the *Validate Blood Pressure website.*

2. Complete staff training on accurate BP measurement.

Proper BP measuring technique, including a repeat measurement if a patient's first BP is high, can result in a more accurate HTN stage classification. Repeat measurements should take place 1-2 minutes apart. Research suggests that approximately one third of patients were reclassified to a lower HTN stage after a repeat BP reading. This can lead to improved decision-making around HTN management.[13]

- Consider how new employees will be trained and develop or modify a BP training checklist to align with your new workflow.
- Establish an annual review process to keep staff engaged and ensure proper BP measurement technique is sustained over time.

3. Use visual reminders to reinforce staff compliance with repeat BPs.

Examples of visual reminders include:

- Consider leaving the BP cuff on a patient with an elevated BP when a second reading is necessary.
- Use a flag or red heart to prompt next steps for clinic staff or patient follow-up.
- Display posters in common areas and exam rooms to serve as reminders. (see Appendix A)

4. Accurate, consistent identification and recording of race and ethnicity.

Efforts to eliminate disparities must first ensure that the race and ethnicity of patients is collected in a diligent manner. Determining race and ethnicity based on appearance alone may lead to inaccurate categorization. Training staff to ask patients to self-report race and ethnicity increases the accuracy of this information and can assist in providing more effective treatment.

KEY DRIVER: Effective Treatment of Adults with Hypertension

The elements included in the Effective Treatment section are appropriate for all patients with HTN and include lifestyle modifications, BP goal setting, and self-monitoring.

Clinic processes to consider:

1. **Staff training and education**
   - Repeat BP technique staff training at least annually.
   - Implement a plan to train new staff, including float pool, on technique and BP-specific protocols.
2. **Use of Drug Treatment Algorithm(s)**
   - Consistent use of the drug treatment algorithm of your choice.
     (See page 11 for recommended example)
3. **Commit to rapid follow-up care**
   - For patients with BP over 130/80 plus DM, CKD, or 10-year PREVENT score ≥7.5% or 140/90, see within two to four weeks.
   - Use PREVENT calculator to determine patient's 10-year CVD risk *Predicting Risk of Cardiovascular EVENTS calculator*
   - Consider use of nursing, pharmacy, or other staff for additional access to care.
   - Telehealth visits may be utilized to review home blood pressure monitoring (HBPM) data. (See page 8 for sample workflow.)

Patient education to consider:

1. **Use of home blood pressure monitoring (HBPM) devices**
   - Consider use of pharmacist or nursing staff to help patient with device setup.
2. **Encourage lifestyle modifications**
   - Discuss Dietary Approaches to Stop Hypertension (DASH) diet.
   - Address smoking /vaping, substance use, caffeinated beverages, and weight loss as appropriate.
   - Encourage increased physical activity, through a structured exercise program that includes aerobic exercise and/or resistance training.
   - Encourage abstinence from alcohol or a maximum of one drink daily for women and two drinks daily for men.[15]
3. **Review special considerations**
   - Review charts on pages 6–7 when treating Black patients and Female patients with diagnosed HTN.

"Predicting Risk of CVD EVENTS (American Heart Association PREVENT) equations are designed to estimate CVD risk based on cardiovascular, kidney, and metabolic health factors."[16] The ACE+ QIP utilizes the base PREVENT-CVD equation to calculate the estimated 10-year risk of CVD in people from ages 30–79 without known CVD.

Considerations For Treating Black Patients With Diagnosed HTN

Provider Factor	Clinical Inertia
	Implicit biases, which occur in an unconscious manner, explain a potential disconnect between what a person explicitly believes and wants to do and the hidden influence of negative implicit associations on thoughts and actions.[17] This can lead to clinical inertia- the failure of providers to adequately treat HTN in some groups. • Using peer-review office visits can help overcome clinical inertia and reduce disparities.[18] • The ability to communicate shared experiences and develop relationships with patients are key in BP management.[19]
Patient Factor	Medication is multi-factorial and modifiable[20,21]
	• Building confidence in Black patients' ability to take their prescribed medication leads to improved control.[22] • Use of single-pill antihypertensive combinations is one method that may be particularly beneficial in Black patients with diagnosed HTN.[23]
	HTN beliefs
	• For Black patients that attributed their HTN to family history, there is potential for decreased medication adherence.[24] • A large percentage of patients rated stress at home as a cause of their HTN.[24]
	Need to improve self-efficacy
	• Clinically, patients have reported that their self-efficacy is an important concern when discussing barriers associated with their ability to take antihypertensive medications.[22] • Self-efficacy is a key predictor of medication adherence over time in Black patients with HTN. Initial levels of self-efficacy are influenced by the presence of depressive symptoms as well as the perceived quality of patient-provider communication.[25]
Community Factors	Community connection
	• Addressing health-related social needs for those who need help is an important strategy.[26] • Considering utilizing resources such as UniteOhio or the Pathway Hubs in Appendix F to facilitate community connections.

Considerations For Treating Women With Diagnosed HTN

Provider Factor	Clinical Inertia
	"Cardiovascular disease in women remains understudied, underrecognized, underdiagnosed, and undertreated".[27]
	HTN Risk Factors Specific to Women:[28]
	The following factors contribute to HTN risk factors for women: • Pregnancy-related: gestational diabetes, gestational HTN, pre-eclampsia, eclampsia. • Early or late menarche. • Early or premature menopause. • Autoimmune or inflammatory disease: rheumatoid arthritis, lupus, irritable bowel disease. • Breast cancer.
Women's Lifespan	**Considerations for reproductive age-non pregnant**
	• Consider low-dose oral contraceptive pills or a progestin-only form of contraception.[15] • Consider alternative forms of birth control where appropriate.[15] • Avoid oral contraceptives in women with uncontrolled HTN.[15]
	Considerations for pregnant women
	• Nifedipine XL (once daily starting dose) and labetalol are considered first-line antihypertensives for non-severe HTN during pregnancy.[29] • Some antihypertensive agents are contraindicated because of potential harm to the fetus.[15]
	Considerations for menopausal women
	• Prevalence of HTN increases after menopause.[28] • Consider type of hormone replacement therapy, transdermal estrogen therapy was associated with lower risk of HTN development and had a neutral effect on BP compared with oral hormone therapy.[30]

Timely Follow-up for HTN

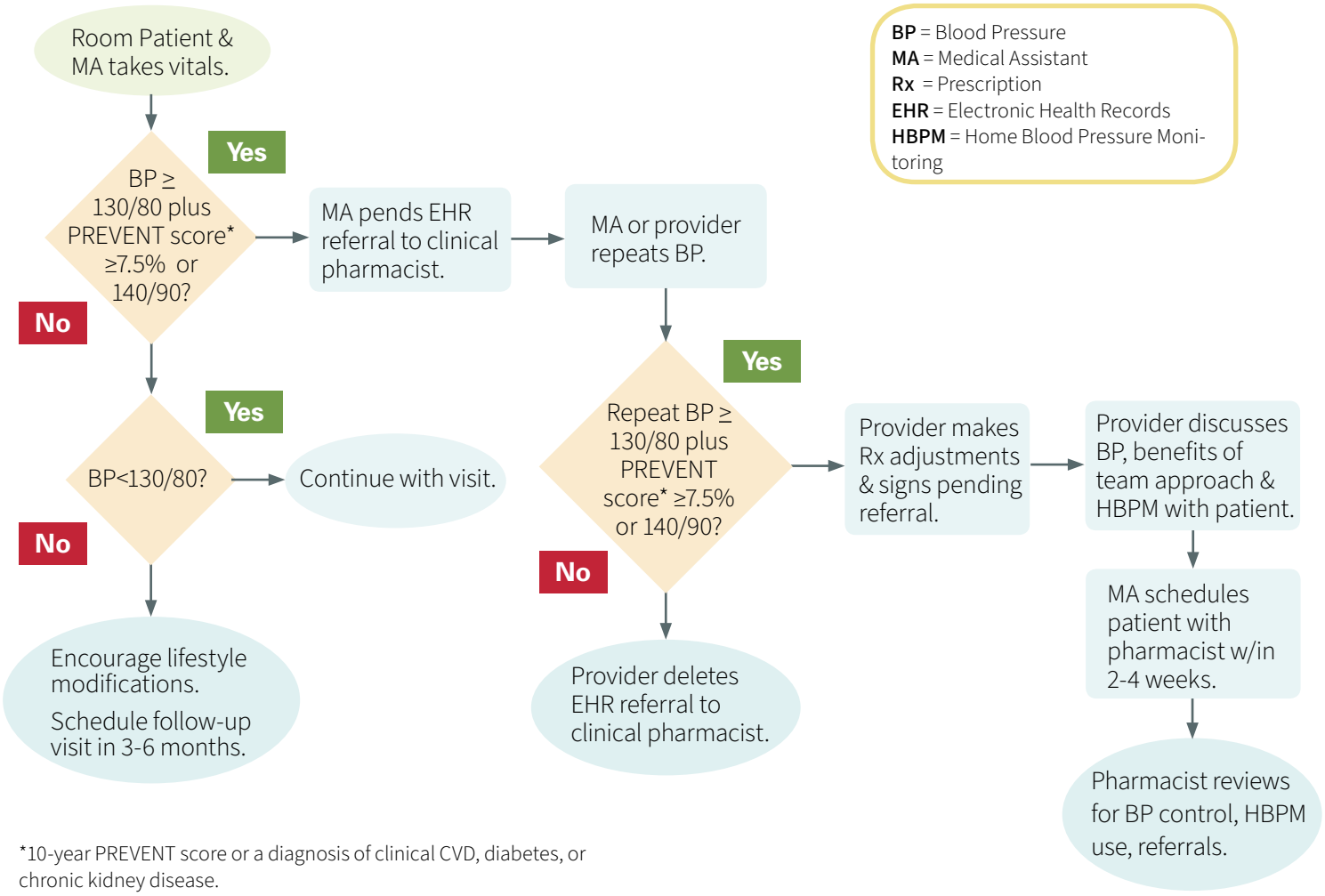
Patients who received a repeat BP and have an elevated BP result should be scheduled for follow-up within two to four weeks.

The purposes of the follow-up HTN visit are to:

1. Obtain additional BP readings.
2. Assess and address barriers to taking medication.
3. Start new or intensify medications in adults who are medication adherent but still have elevated BPs.
4. Provide education on HTN, including lifestyle modification and the DASH diet.
5. Provide HBPM instructions.
6. Assist with HBPM goal-setting.

Scheduling a Follow-up Visit

To increase the number of patients returning for follow-up visits, establish guidelines and a referral process for HTN follow-up. Consider all visit options such as telehealth, group visits, or utilizing pharmacy or nursing staff. If using telehealth visits, consider discussing copay with patients prior to telehealth appointment. A sample workflow is shared below for your consideration.



*10-year PREVENT score or a diagnosis of clinical CVD, diabetes, or chronic kidney disease.

Incorporating Home Blood Pressure Monitoring Into Your Clinic

HBPM processes are integral to a patient's BP control. Key process changes can help address the utilization of HBPM monitoring and ensure the patient receives the necessary care and follow-up.

1. **Have clinic staff ensure that all patients with an elevated BP can access a HBPM device.**
    - Review *Validate Blood Pressure Resource* for a list of validated HBPM units.
    - Encourage use of arm cuff units only, and that patient has the correct cuff size.
        - » In certain circumstances, such as when an extra large cuff is unavailable to meet the patient's needs, a validated wrist cuff may be considered as an alternative.
    - Ensure the cuff is covered by patient's insurance plan.

2. **Identify the appropriate clinic staff to provide patient support and education for HBPM. Consider pharmacists and/or nurse extenders to:**
    - Assist in setting up the HBPM device and ensure the patient understands how to use the device and the proper technique for an accurate BP.
    - Assist with Bluetooth connections for compatible devices, as needed.
    - Titrate medication, if needed and with pharmacy oversight.
    - Provide patient education on topics such as DASH diet and exercise benefits.
    - Consider using alternative staff to provide patient education for HBPM, see Multidisciplinary Team key driver, page 14 .

3. **Decide how and when patients should share HBPM data.**
    - At a minimum, encourage patients to record HBPM readings twice daily for 3 days.[31]
    - Share HBPM data in one of the following ways:
        - » Direct connection to the patient portal via Bluetooth-enabled HBPM devices.
        - » Advise the patient to bring the device to the next appointment for review.
        - » Provide a paper BP log to capture readings and advise the patient to upload a picture to the patient portal or bring to their next appointment.

4. **Determine a threshold or criteria at which to notify the provider to review data or identify the next steps.**

5. **The economic case for HBPM is also worth reviewing.[32] Use the following CPT codes to reimburse for HBPM activities.[33]**
    - CPT code **99743:** Use once when staff provides HBPM training, device set up and/or calibration, and instruction for at-home BP monitoring.
    - CPT code **99744:** Use once a month for ongoing treatment, such as electronic or in-person review of BP logs to inform next steps.

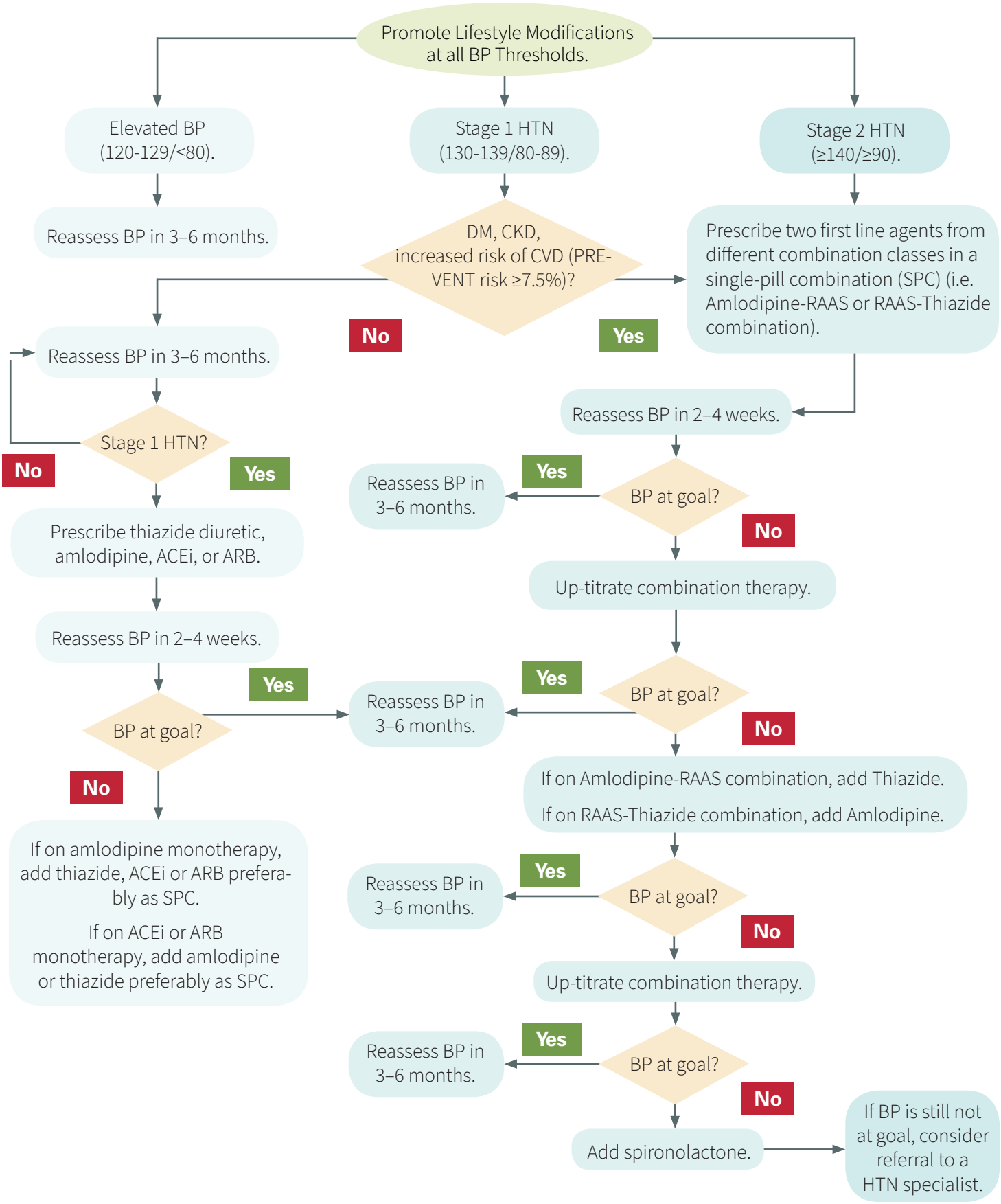
HTN Drug Treatment Guidelines

The algorithm on page 11 shows a simple, effective pharmacologic therapy approach for treating adult patients with HTN. It prioritizes lifestyle change and once daily, dual/triple combination, low cost medications.

Next steps for your clinic:

1. Choose a HTN treatment guideline and use it!
   - » There are many guidelines to consider. The proposed treatment algorithm on page 11 is based on the updated 2025 AHA BP guidelines. Additional algorithm examples, from the SPRINT trial and Kaiser Permanente, can be found in Appendix B.
2. Commit to quick follow-up (2-4 weeks) for patients with uncontrolled high BP. This system can include nurse visits and clinical pharmacists as well.
3. Monitor for treatment adherence.
4. Reference the Ohio Unified Preferred Drug List at *the Ohio Medicaid Pharmacy Program*. Medical reference lists are provided in Appendices C, D, and E.

HTN Algorithm: Adapted from AHA/ACC 2025 Blood Pressure Guidelines and Cardi-OH HTN Algorithms



KEY DRIVER: Community Connection

Discussing health-related social needs provides an important opportunity to identify and address barriers impacting your patients' ability to fully manage their CVD risk.[34]

Connecting patients to community resources is a vital part of this process. A sample workflow is shown on page 14 to capitalize on team-based care. After a screening is completed, document in the EHR, and connect those in need with community partners.

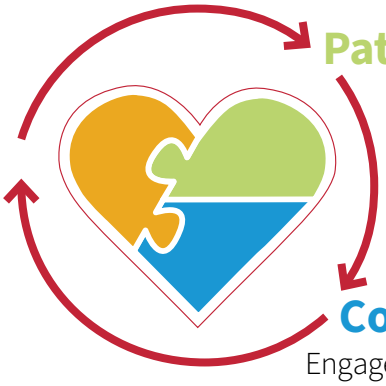
Health-Related Social Need Domains

Non-medical

- Financial Strain
- Food Insecurity
- Housing stability
- Social Connections
- Stress
- Transportation Needs

Medical

- Alcohol use
- Depression & Anxiety
- Physical Activity
- Tobacco Use/Nicotine Use



Health-Related Social Need Screening Tools

There are many validated tools to assess for health-related social needs. A few options are listed below:

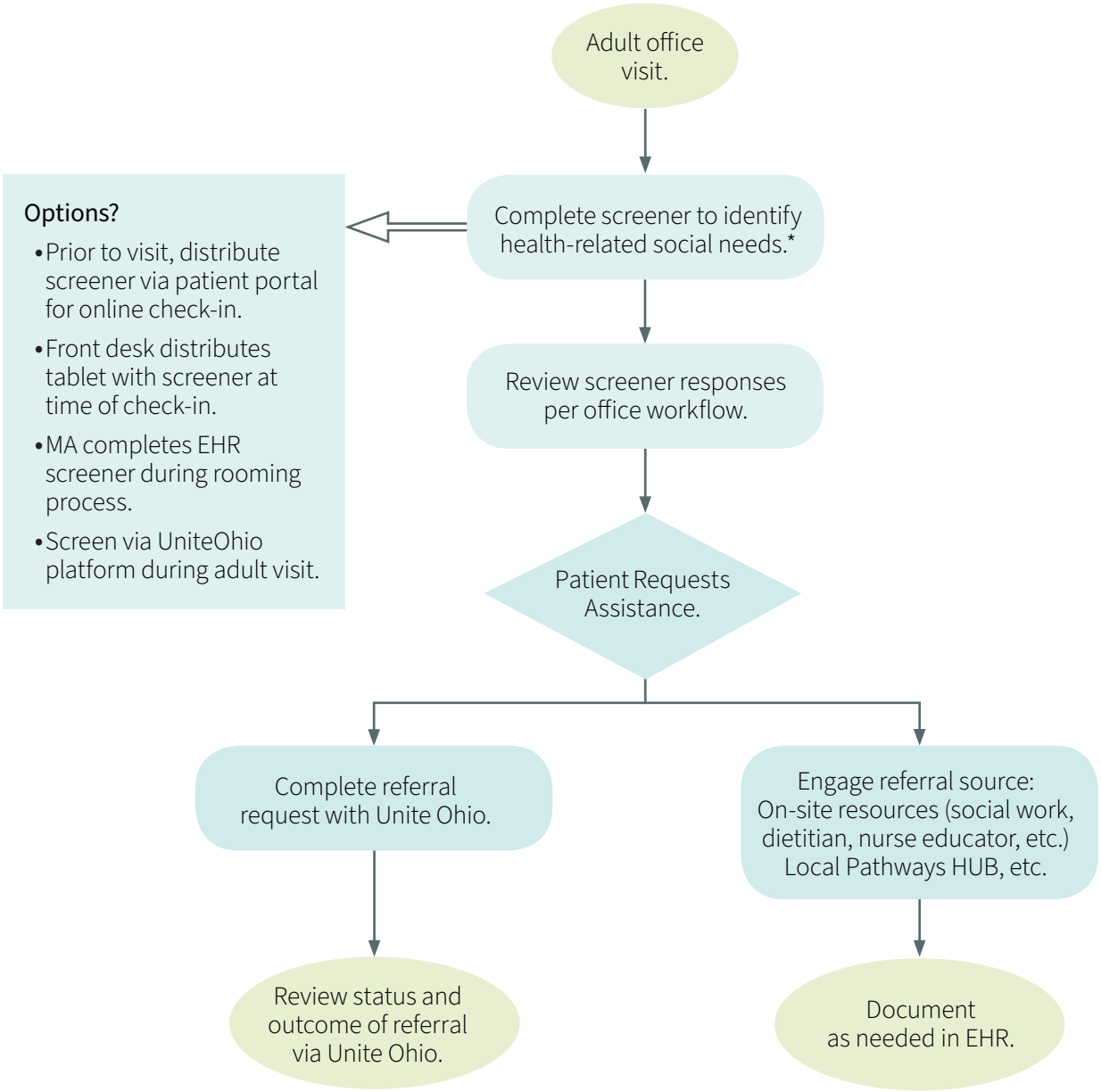
- AAFP: *The EveryONE Project* [35]
- CMMI: *Screening Tool* [30]
- *Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences Screening Tool Screening Tool*[37]
- EPIC: SDOH Tool is available to EPIC users, it uses a proprietary screener that has elements from many sources.

Consider referring to Ohio Pathways HUB providers in your area, see Appendix F. UniteOhio offers EHR integration or a web-based platform for access to a coordinated care network of health and social service resources. This platform can assist with making closed-loop referrals.

AAFP: American Academy of Family Physicians; **CMMI**: Centers for Medicare & Medicaid Innovation; **PRAPARE**: Protocol for Responding to and Assessing Patients' Assets, Risks and Experiences; **SDOH**: Social Determinants of Health.

Completing Community Referrals Workflow

The goal of this workflow is to link patients at highest risk for CVD to community lifestyle change programs and other community resources. Consider using a referral platform, like UniteOhio. If your clinic does not have access to UniteOhio, contact us to explore this possibility. Continue using your EHR to it's fullest potential for screening and referral options.



*Beginning calendar year 2024 CMS began providing an additional payment if the screening is completed during a qualifying visit (CPT code: G0136).[38]

KEY DRIVER: Multidisciplinary Team

Utilizing social services to improve health

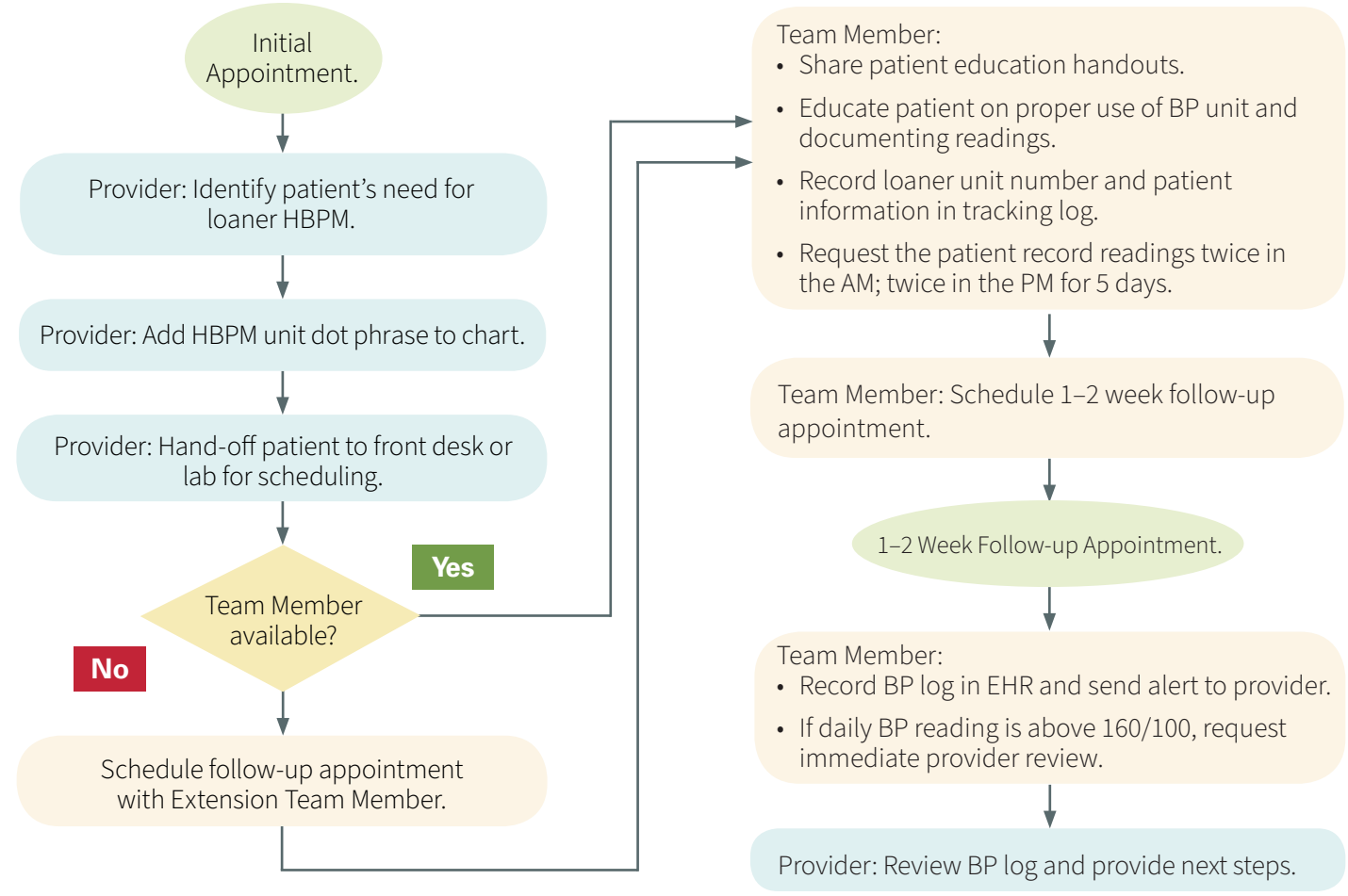
The utilization of team members, such as nurses, clinical pharmacists, and dietitians, can help improve HTN control at practices.[39] Expanding HTN care responsibilities to other team members can support treatment adherence.[40] A sample multidisciplinary team workflow is shown below. Consider the available team members in your practice and how those team members might assist with HTN management.

Examples of Multidisciplinary Team Approach

- Consider use of nurse visits or clinical pharmacists to address rapid follow up, patient engagement, and/or medication titration.
- Utilize dietitians to provide heart healthy diet information, as available.
- Leverage community health workers to connect patients with resources, where possible.

Sample loaner HBPM Workflow with Multidisciplinary Team

Work with your QI coach to develop a site-specific workflow for other ways to extend care team.



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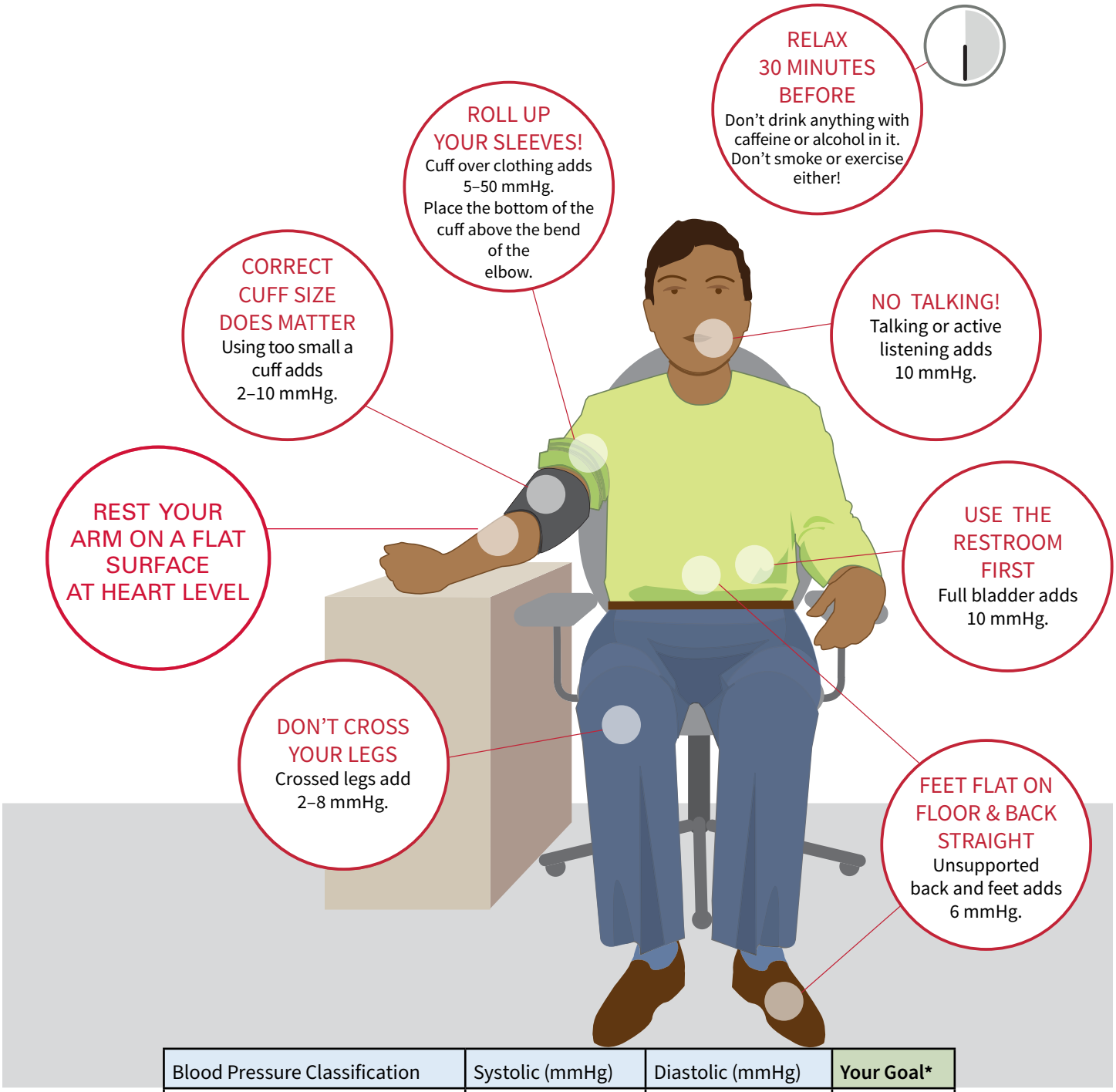
APPENDICES

APPENDIX A: BLOOD PRESSURE MEASUREMENT INSTRUCTIONS



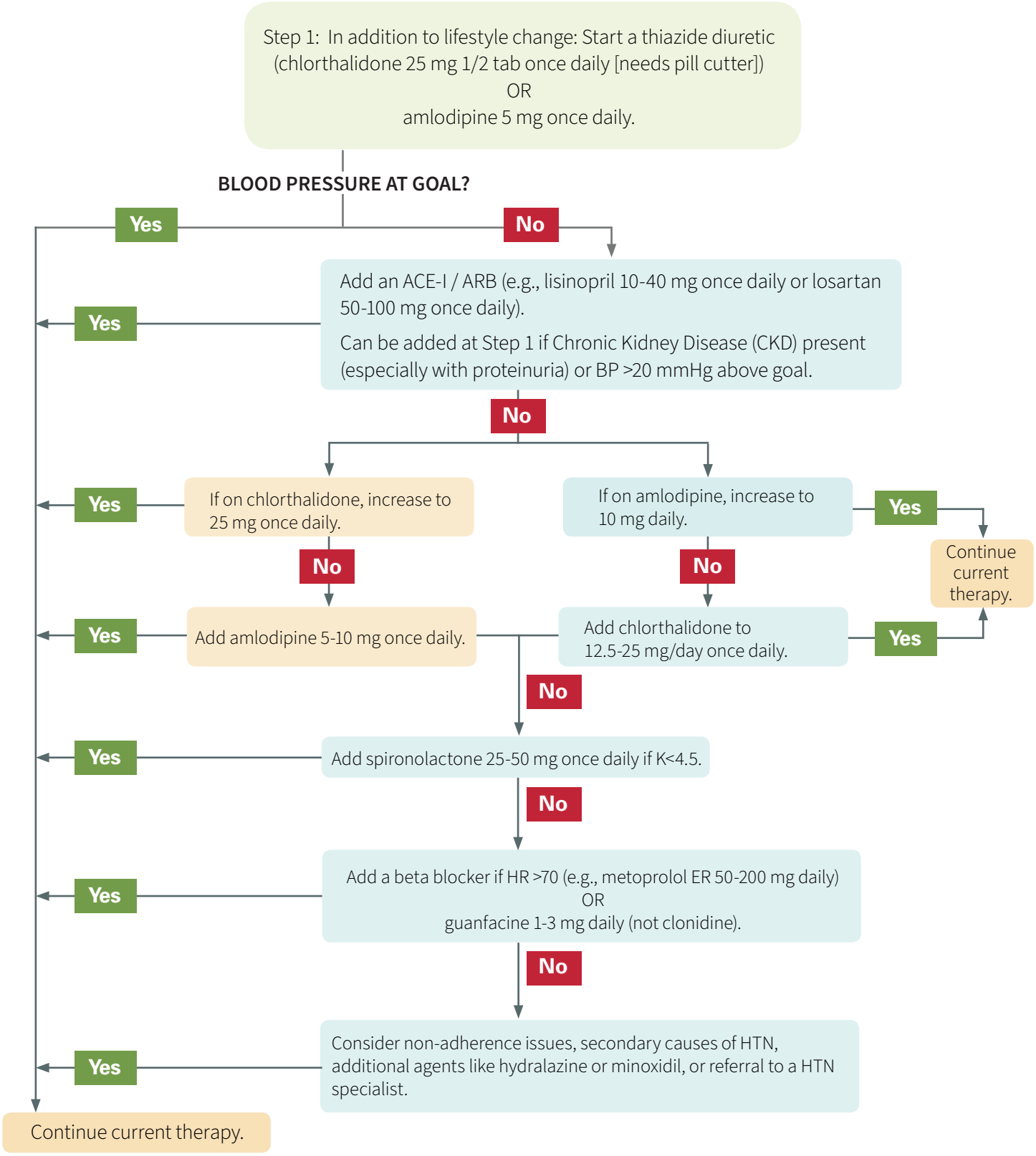
Blood Pressure Classification	Systolic (mmHg)	Diastolic (mmHg)	Your Goal*
Normal	<120	and <80	**<130/80**
Prehypertension	120-129	and <80	
Stage 1 Hypertension	130-139	or 80-89	
Stage 2 Hypertension	≥140	or ≥90	

These guidelines are based on the AHA 2025 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. Check with your provider to see if <120 systolic is right for you.

Materials adapted from TARGET:BP in conjunction with American Heart Association and American Medical Association.

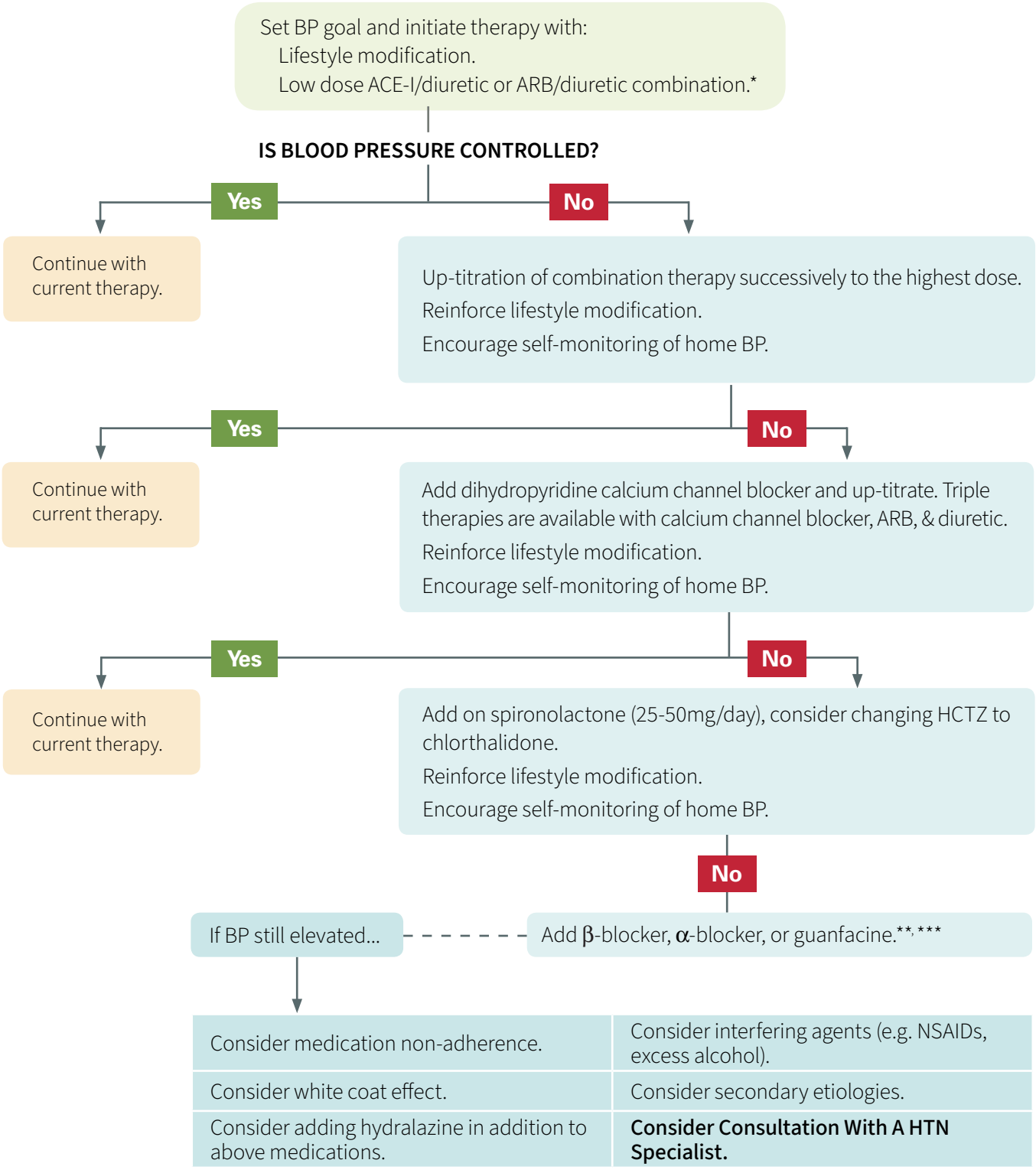
APPENDIX B: Updated SPRINT-based HTN Drug Treatment Algorithm[41]

Use of a validated treatment algorithm will improve blood pressure control within your practice. This example, recommended for use in the Systolic Blood Pressure Intervention Trial (SPRINT), is one option. Medication reference lists are provided in Appendix C, D and E.



APPENDIX B: **Classic HTN Drug Treatment Guideline**[42] (Kaiser Permanente-based)

Use of a validated treatment algorithm will improve blood pressure control within your practice. Medication reference lists are provided in Appendix C, D and E.



*If pregnant or pregnancy potential, avoid using ACE-I or ARB or spironolactone
**Avoid starting a beta blocker if pulse <70 or on a non-dihydropyridine calcium channel blocker
***Guanfacine has similar mechanism of action as clonidine and is once daily instead of three times a day

APPENDIX C: Medication Reference List for Staff-led HTN Visits

The table below can be used by nurses and other staff during follow-up HTN visits to monitor for side effects and determine whether lab work is needed based on the medication class being used.

Commonly Associated Side Effects Of Blood Pressure Medications

Medication Class (generic names of individual medications)	**Common Side Effects**
Needs metabolic panel if starting or increasing this med class	
Diuretics (e.g., hydrochlorothiazide, chlorthalidone)	Increased urination (often goes away if used daily for several weeks), rash, low potassium
ACE-inhibitors (e.g., lisinopril, enalapril, benazepril)	Dry cough, increased potassium, increased creatinine
Angiotensin receptor blockers (e.g., losartan, valsartan)	Increased potassium, increased creatinine
Combinations which include an ACE-I, ARB, or diuretic	See side effects under individual classes
Aldosterone antagonist (e.g., spironolactone)	Increased potassium, increased creatinine, gynecomastia
No metabolic panel needed if starting or increasing this med class	
Calcium channel blockers (e.g., amlodipine, nifedipine XL)	Ankle edema
Beta blockers (e.g., metoprolol, atenolol, carvedilol)	Fatigue (usually gets better after several weeks), slowed heart rate (watch for pulse <60)
Alpha blockers (e.g., doxazosin, prazocin, terazocin)	Orthostatic hypotension
Centrally acting alpha-2 adrenergic agonist (e.g., clonidine, guanfacine)	Sedation, dry mouth, rebound HTN if stopped suddenly
Vasodilators (e.g., hydralazine, minoxidil)	Headache, edema, tachycardia

Abbreviations: ACE-I = Angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker

APPENDIX D: Types of Antihypertensive Combination Medications

Research indicates that single-pill combination therapy should be prescribed, as the vast majority of Black patients with diagnosed hypertension will need more than one antihypertensive agent to achieve BP goal <130/80. Furthermore, the likely lowering of BP goal targets will further necessitate the use of multiple agents.[43]

Types of Antihypertensive Combination Medications

Triple Combination	
Tribenzor (Pro)	Generic name: amlodipine / hydrochlorothiazide / olmesartan
Exforge HCT (Pro)	Generic name: amlodipine / hydrochlorothiazide / valsartan
Dual Combination	
ACE inhibitors with calcium channel blockers	
Tarka (Pro)	Generic name: trandolapril / verapamil
Lotrel (Pro)	Generic name: amlodipine / benazepril
Amlobenz	Generic name: amlodipine / benazepril
Lexxel	Generic name: enalapril / felodipine
Prestalia (Pro)	Generic name: amlodipine / perindopril
ACE inhibitors with thiazides	
Zestoretic (Pro)	Generic name: hydrochlorothiazide / lisinopril
Prinzide (Pro)	Generic name: hydrochlorothiazide / lisinopril
Uniretic (Pro)	Generic name: hydrochlorothiazide / moexipril
Accuretic (Pro)	Generic name: hydrochlorothiazide / quinapril
Capozide	Generic name: captopril / hydrochlorothiazide
Capozide 25 / 15	Generic name: captopril / hydrochlorothiazide
Capozide 25 / 25	Generic name: captopril / hydrochlorothiazide
Capozide 50 / 15	Generic name: captopril / hydrochlorothiazide
Capozide 50 / 25	Generic name: captopril / hydrochlorothiazide
Lotensin HCT (Pro)	Generic name: benazepril / hydrochlorothiazide
Monopril HCT (Pro)	Generic name: fosinopril / hydrochlorothiazide
Quinaretic	Generic name: hydrochlorothiazide / quinapril
Vaseretic (Pro)	Generic name: enalapril / hydrochlorothiazide
Angiotensin II receptor blockers with calcium channel blockers	
Azor (Pro)	Generic name: amlodipine / olmesartan
Twynsta (Pro)	Generic name: amlodipine / telmisartan
Exforge (Pro)	Generic name: amlodipine / valsartan
Angiotensin II receptor blockers with thiazides	
Teveten HCT (Pro)	Generic name: eprosartan / hydrochlorothiazide
Avalide (Pro)	Generic name: hydrochlorothiazide / irbesartan
Micardis HCT (Pro)	Generic name: hydrochlorothiazide / telmisartan
Edarbyclor (Pro)	Generic name: azilsartan medoxomil / chlorthalidone
Hyzaar (Pro)	Generic name: hydrochlorothiazide / losartan
Benicar HCT (Pro)	Generic name: hydrochlorothiazide / olmesartan
Diovan HCT (Pro)	Generic name: hydrochlorothiazide / valsartan
Atacand HCT (Pro)	Generic name: candesartan / hydrochlorothiazide

APPENDIX D: Types of Antihypertensive Combination Medications *(continued)*

Dual Combination: *continued*	
Antiadrenergic agents (central) with thiazides	
Aldoril (Pro)	Generic name: hydrochlorothiazide / methyldopa
Clorpres (Pro)	Generic name: chlorthalidone / clonidine
Antiadrenergic agents (peripheral) with thiazides	
Enduronyl	Generic name: deserpidine / methyclothiazide
Minizide	Generic name: polythiazide / prazosin
Renese-R	Generic name: polythiazide / reserpine
Beta blockers with thiazides	
Corzide 80 / 5	Generic name: bendroflumethiazide / nadolol
Tenoretic 50	Generic name: atenolol / chlorthalidone
Ziac (Pro)	Generic name: bisoprolol / hydrochlorothiazide
Corzide (Pro)	Generic name: bendroflumethiazide / nadolol
Corzide 40 / 5	Generic name: bendroflumethiazide / nadolol
Dutoprol (Pro)	Generic name: hydrochlorothiazide / metoprolol
Inderide (Pro)	Generic name: hydrochlorothiazide / propranolol
Lopressor HCT (Pro)	Generic name: hydrochlorothiazide / metoprolol
Tenoretic (Pro)	Generic name: atenolol / chlorthalidone
Tenoretic 100	Generic name: atenolol / chlorthalidone
Timolide	Generic name: hydrochlorothiazide / timolol
Miscellaneous antihypertensive combinations	
Consensi (Pro)	Generic name: amlodipine / celecoxib
Exforge HCT (Pro)	Generic name: amlodipine / hydrochlorothiazide / valsartan
Caduet (Pro)	Generic name: amlodipine / atorvastatin
BiDil (Pro)	Generic name: hydralazine / isosorbide dinitrate
Tekturna HCT (Pro)	Generic name: aliskiren / hydrochlorothiazide
Tribenzor (Pro)	Generic name: amlodipine / hydrochlorothiazide / olmesartan
Valturna (Pro)	Generic name: aliskiren / valsartan
Amturnide (Pro)	Generic name: aliskiren / amlodipine / hydrochlorothiazide
Apresazide	Generic name: hydralazine / hydrochlorothiazide
Byvalson (Pro)	Generic name: nebivolol / valsartan
Ser-Ap-Es	Generic name: hydralazine / hydrochlorothiazide / reserpine
Tekamlo (Pro)	Generic name: aliskiren / amlodipine
Potassium sparing diuretics with thiazides	
Maxzide (Pro)	Generic name: hydrochlorothiazide / triamterene
Aldactazide (Pro)	Generic name: hydrochlorothiazide / spironolactone
Moduretic 5-50	Generic name: amiloride / hydrochlorothiazide
Dyazide (Pro)	Generic name: hydrochlorothiazide / triamterene
Maxzide-25	Generic name: hydrochlorothiazide / triamterene

APPENDIX E: HTN Medication Reference List for Providers

Pharmacologic Therapy[44]

Drug Class	Examples	Comments
Thiazide-type Diuretics	Chlorthalidone HCTZ	• May worsen hyperuricemia/gout. • Monitor serum potassium and creatinine levels initially, then within 2-4 weeks and annually thereafter if normal. • May cause photosensitivity (rare). • Chlorthalidone twice as potent and half-life 2-3 times longer than HCTZ at given dose.
Angiotensin-Converting-Enzyme Inhibitors (ACE-I)	Lisinopril Ramipril Benazepril Enalapril	• Contraindicated in pregnancy. • Possible dry cough and/or angioedema. • Avoid concomitant use with an ARB or direct renin inhibitor or ARNI*. • Monitor serum potassium and creatinine initially, then within 2-4 weeks and annually thereafter if normal. • Up to 30% increase in serum creatinine after initiation of therapy considered normal. Consider interruption, discontinuation, and screening for renal artery stenosis.
Angiotensin Receptor Blocker (ARB)	Candesartan Irbesartan Losartan Valsartan Olmesartan Telmisartan	• Contraindicated in pregnancy. • Avoid concomitant use with an ACE-I or direct renin inhibitor or ARNI*. • Monitor serum potassium and creatinine initially, then within 2-4 weeks and annually thereafter if normal. • Up to 30% increase in serum creatinine after initiation of therapy considered normal. Consider interruption, discontinuation, and screening for renal artery stenosis.
Dihydropyridine Calcium Channel Blockers (DHP CCB)	Amlodipine Felodipine Nifedipine	• More common adverse drug reactions may include lower extremity edema and headache (often temporary). • Hepatic dysfunction can increase levels (begin at lower doses). • Amlodipine half-life more than twice that of felodipine or available sustained-release nifedipine.
Non-DHP CCB	Verapamil Diltiazem	• Verapamil may cause constipation and is contraindicated in AV node dysfunction, systolic HF and decreased LV function. • Diltiazem associated with less constipation but also contraindicated in AV node dysfunction, systolic HF and decreased LV function. • Hepatic dysfunction can increase levels (begin at lower doses).

*The only ARNI currently available is Entresto® (valsartan/sacubitril). It is NOT FDA-approved for HTN and should only be used in patients with chronic heart failure class II to IV. If a patient is on Entresto®, they should NOT be on concurrent ACE-I or ARB therapy.

Abbreviations: ACE-I = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; ARNI = angiotensin receptor–neprilysin inhibitors; DHP CCB = dihydropyridine calcium channel blockers ; HCTZ = Hydrochlorothiazide.

Pharmacologic Therapy[44] *(continued)*

Drug Class	Examples	Comments
Beta Blockers	Non-selective Propranolol Cardioselective Atenolol Metoprolol (Tartrate & Succinate) Combined alpha- and beta-blocker Carvedilol Labetalol	• Discontinue with slow taper over a period of at least one week. • Avoid combination with non-DHP CCBs and centrally acting alpha-2 adrenergic agonists due to increased risk of bradycardia and heart block. • As dose increases, cardioselectivity decreases. • Use with caution in patients with COPD, asthma, diabetes, and peripheral vascular disease; may want to consider use of a cardioselective BB in patients with those comorbid conditions. • Concurrent use of centrally acting alpha-2 adrenergic agonists and a beta blocker may result in increased risk of sinus bradycardia. • An exaggerated clonidine withdrawal response, including rebound HTN, may be seen with beta blockers (except for labetalol or carvedilol).
Aldosterone Antagonists	Spironolactone Eplerenone	• Avoid use in cases of hyperkalemia (K+ > 5.0 mmol/L) or severe kidney dysfunction (GFR < 30 mL/min). • Dosing interval should be increased as renal function declines to every 24-48 hours for GFR < 50 mL/min. • Monitor potassium and kidney function initially, then within 2-4 weeks and annually thereafter if normal. • Higher risk of gynecomastia with spironolactone than eplerenone.
Alpha-Adrenergic Blockers	Doxazosin Prazosin Terazosin	• Initiate at low doses. • Administer first dose at bedtime to avoid syncope. • Could be beneficial in patients with benign prostatic hyperplasia and HTN. • Alpha blockers are not recommended as a single agent for treating HTN.
Centrally Acting Alpha-2 Adrenergic Agonist	Clonidine Guanfacine Methyldopa	• Monitor for adverse drug reactions such as somnolence and dry mouth. • Discontinue with a slow taper to avoid rebound HTN and withdrawal symptoms. • Concurrent use of centrally acting alpha-2 adrenergic agonists and a beta blocker may result in increased risk of sinus bradycardia and an exaggerated clonidine withdrawal response, including rebound HTN. • Note: Guanfacine has similar mechanism of action as clonidine but can be given once daily.
Vasodilator	Hydralazine Minoxidil	• May result in edema and reflex tachycardia that respond well to concomitant use of a diuretic and beta-blocker. • Hydralazine can be prescribed twice daily. • Monitor for headache and lupus-like syndrome (dose-related) with hydralazine. • Monitor for hypertrichosis and fluid overload, including pericardial effusions with minoxidil (should monitor volume status closely).

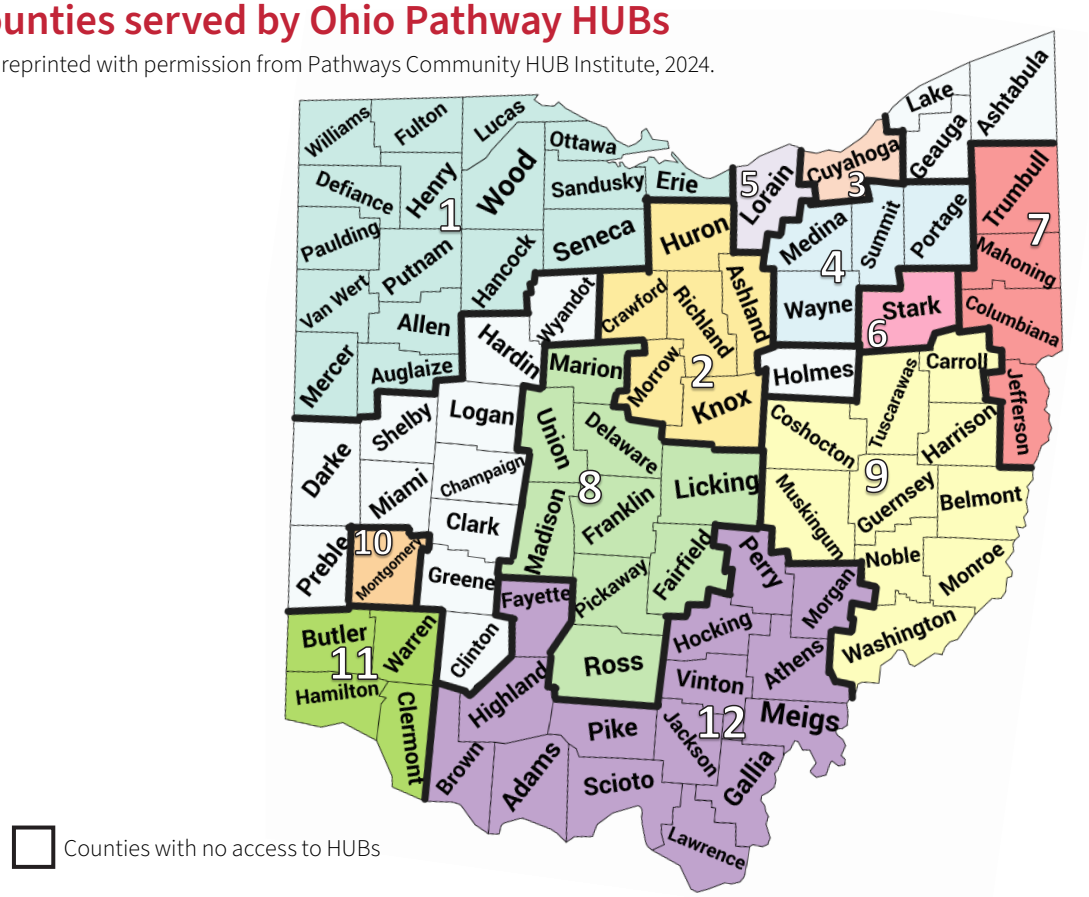
Abbreviations: BB = beta blocker; ALDO ANTAG = Aldosterone antagonist; DHP CCB =dihydropyridine calcium channel blockers.

APPENDIX F: Pathways HUB Models in Ohio

Services and procedures vary by location. Please reach out to the your nearest HUB to assist your patients in addressing health-related social needs that may be impacting their ability to address health concerns.

Counties served by Ohio Pathway HUBs

Map reprinted with permission from Pathways Community HUB Institute, 2024.



Counties with no access to HUBs

	Hub Name	Web Address
1	Northwest Ohio Pathways HUB	Northwest Ohio Pathways HUB Website
2	Community Health Access Project (CHAP)	Community Health Access Project (CHAP) Website
3	Better Health Partnership Pathways HUB	Better Health Partnership Pathways HUB Website
4	Pathways HUB Community Action	Pathways HUB Community Action Website
5	Lorain County Community Action Program (LCCAA) Pathways HUB*	Lorain County Community Action Program Pathways HUB Website*
6	Stark County Community Action Pathway HUB	Stark County Community Action Pathway HUB Website
7	Mahoning Valley Pathways HUB	Mahoning Valley Pathways HUB Website
8	Central Ohio Pathways Hub	Central Ohio Pathways Hub Website
9	Bridges to Wellness HUB (Formerly Access Tuscarawas)	Bridges to Wellness HUB Website
10	Dayton Regional Pathways HUB	Dayton Regional Pathways HUB Website
11	Health Care Access Now	Health Care Access Now Website
12	Corporation of Ohio Appalachian Development (COAD) Pathways HUB*	Corporation of Ohio Appalachian Development (COAD) Pathways HUB* Website

* Entity not yet certified.

Supplemental Materials

APPENDIX G: **Effective Treatment of Hyperlipidemia** (Created 2024)

Cholesterol is a lipid that is the main animal sterol, a central component of cellular structures, and a precursor of many hormones. Triglycerides are also lipids and are chemical fats. Saturated fats are solid at room temperature (e.g., butter); unsaturated fats are liquid at room temperature (e.g., oils). Currently, the most clinically relevant types of lipoproteins are:

$$\frac{\text{Total Cholesterol} - \text{HDL}}{\text{Non-HDL Cholesterol}}$$

- High-density lipoprotein (HDL) which carries mostly cholesterol from body tissues to the liver; HDL is considered the "good cholesterol."
- Low-density lipoprotein (LDL) which carries mostly cholesterol to body tissues and is associated with atherosclerotic cardiovascular disease (ASCVD); LDL is considered the "bad cholesterol."
- Very low-density lipoprotein (VLDL) carries mostly triglycerides to body tissues.

What is hyperlipidemia?

Hyperlipidemia represents an elevated level of lipids in the body. Clinical laboratories generally interpret lipid values as presented in Table 1.

	Suboptimal (mg/dL)	Desirable (mg/dL)	Recommended if high CV risk*	Recommended if very high CV risk**
Total Cholesterol	> 240	< 200		
Non-HDL Cholesterol		< 130		
LDL	> 160	< 100	< 70	< 55
Triglycerides	> 200	< 150		
HDL	< 40	> 40 (for men) > 50† (for women)		

* History of diabetes mellitus, coronary artery disease (CAD), ischemic stroke, or transient ischemic attack, as defined by the American Heart Association (AHA)

**History of multiple major atherosclerotic cardiovascular disease (ASCVD) events (e.g., myocardial infarction, ischemic stroke, or symptomatic peripheral artery disease) or 1 major ASCVD event and multiple high-risk conditions (e.g., diabetes mellitus, HTN, chronic kidney disease, current smoking)[A]

† HDL >90 mg/dL may be indicative of increased health risk rather than health benefit.[45]

Table 1: Clinical laboratory interpretation of lipid value

For primary prevention of ASCVD, serum lipids are most commonly evaluated and managed based on overall ASCVD risk. Nonfasting lipid tests are generally acceptable to evaluate serum lipid levels and associated ASCVD risk. To estimate a patient's 10-year ASCVD risk, consider utilizing the American College of Cardiology's (ACC) ASCVD Risk Estimator, which is built into many electronic health records.[46] *Cardiovascular Disease Risk Assessment Tool*

[A] Lloyd-Jones DM, Morris PB, Ballantyne CM, et al. 2022 ACC Expert Consensus Decision Pathway on the Role of Nonstatin Therapies for LDL-Cholesterol Lowering in the Management of Atherosclerotic Cardiovascular Disease Risk: A Report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol, 80(14), 1366-1418. doi:10.1016/j.jacc.2022.07.006

APPENDIX G: Effective Treatment of Hyperlipidemia

When to treat hyperlipidemia and/or ASCVD risk?

Primary Prevention

For primary prevention, current guidelines recommend treating hyperlipidemia with statins for patients who have 1) 10-year ASCVD risk ≥20%, 2) LDL levels ≥190 mg/dL, 3) diabetes mellitus, or 4) known familial hypercholesterolemia. For other patients, current guidelines recommend clinical discussion of ASCVD risk calculation and additional "risk enhancers" such as family history of premature ASCVD, chronic kidney disease, history of preeclampsia or premature menopause, and comorbid inflammatory diseases.[47-50] See Page 30 for a sample risk treatment algorithm.[51]

Shared Decision Making

Try the Mayo Clinic's Statin Choice Decision Aid for individualized visualization for clinical decision making.[42] *https://statindecisionaid.mayoclinic.org/*

Secondary Prevention[31]

For secondary prevention of ASCVD --in patients who have a personal history of CAD, ischemic stroke, transient ischemic attack, or peripheral artery disease --patients should be on statin therapy. Statin add-on therapies such as ezetimibe and/or PCSK9 inhibitors may be considered for treatment intensification to achieve LDL goals. As outlined in Table 1, the LDL goal should be less than 70 mg/dL (or less than 55 mg/dL if considered very high CV risk). We suggest reviewing prior CT chest images to assess for presence of CAD.

How to treat hyperlipidemia and/or ASCVD risk?

- Encourage healthy diet and exercise lifestyle modifications for all adult patients. These components affect your cholesterol in different ways.
- Exercise is known to increase HDL "good cholesterol" levels and lower triglycerides. The AHA recommends at least 150 minutes of moderate-intensity aerobic activity per week.
  - » Diet is important in lowering LDL "bad cholesterol" and triglycerides. Dietary cholesterol contributes significantly but not alone to serum total cholesterol levels.
  - » AHA recommends less than 300 mg of dietary cholesterol per day.
  - » **Saturated fats increase LDL levels and are thus considered less healthy compared to unsaturated fats. The AHA recommends that less than 6% of daily calories come from saturated fat.**

Often, medications are necessary to reduce serum lipid levels and/or associated ASCVD risk. Medication classes are introduced below. See Page 32 for additional detail.

Statins are first-line LDL and triglyceride lowering agents. Statins lower LDL and triglyceride levels by reducing cholesterol biosynthesis and increasing hepatic LDL receptors to remove serum LDL and VLDL. Statins also stabilize atherosclerotic plaque, reducing risk of thromboembolic events. Statins can either be low-, moderate-, or high-intensity based on their cholesterol-lowering capacities. Statins can also be lipophilic (can easily enter cells) versus hydrophilic (more hepatoselective).

Ezetimibe lowers LDL levels by inhibiting small intestine cholesterol absorption and has shown additive LDL-lowering benefit to high-intensity statin therapy.

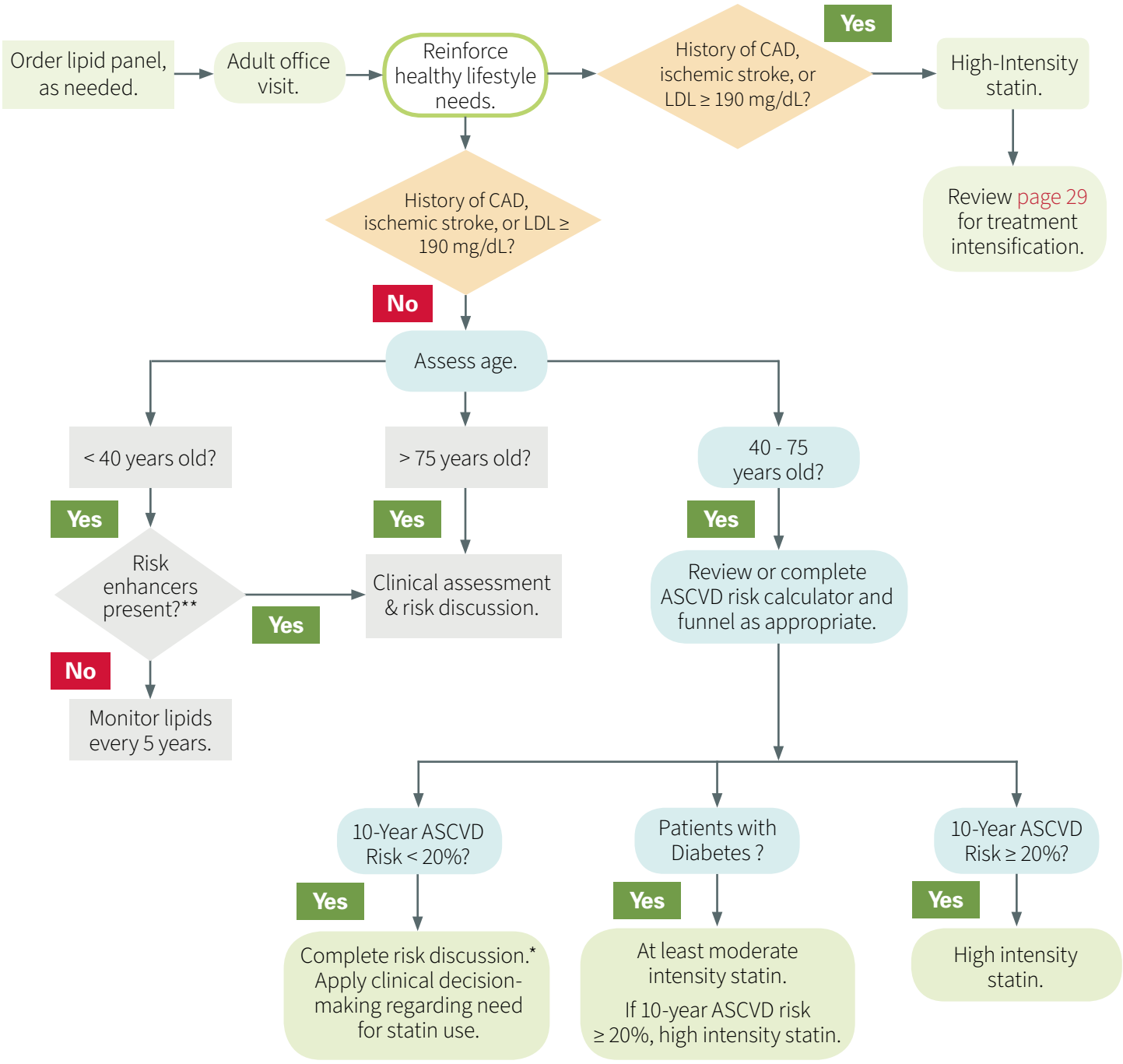
PCSK9 inhibitors (Repatha, Praluent, Leqvio) lower LDL levels by increasing hepatic LDL receptors. Explore coverage feasibility before prescribing.

Fibrates stimulate fatty acid uptake and catabolism, and vitamin B3 (niacin) may increase lipoprotein degradation and inhibit triglyceride biosynthesis. Neither of these medication classes has shown clear clinical benefit when used in combination with statin therapies and are thus less commonly prescribed. Avoid use of niacin in patients with dysglycemia.

Omega-3 fatty acids (alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA)) have been shown to lower triglycerides by increasing fatty acid oxidation. Of this medication class, EPA (or icosapent ethyl, an ethyl ester of EPA) monotherapy has demonstrated higher and more consistent cardiovascular risk reduction.[53]

APPENDIX G: Effective Treatment of Hyperlipidemia

Sample ASCVD Risk Treatment & Statin Use Workflow



MI = Myocardial Infarction
CAD = Coronary Artery Disease
TIA = Transient Ischemic Attack
PVD = Peripheral Vascular Disease
PAD = Peripheral Artery Disease

*For risk discussion, consider the number of risk enhancers present and severity to inform the patient conversation around statin use.

**ASCVD risk enhancers:

- Family history of early CVD.
- Persistent LDL ≥160 mg/dL. or triglycerides ≥175 mg/dL.
- Smoking.
- Elevated BP.
- Chronic Kidney Disease.
- History of preeclampsia or menopause < 40 years.
- Inflammatory conditions (e.g., autoimmune diseases or HIV).

Adapted from the ACC/AHA primary prevention strategy.[51]

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Monitoring Suggestions and Timely Follow-up Care

The frequency of lipid monitoring is not clinically certain.[54] The National Heart, Lung, and Blood Institute generally recommends lipid monitoring:

- Every five years starting at age 9 to 11 years old (or younger if there is a family history);
- Every one to two years for men aged 45 to 65 and women aged 55 to 65; and
- Every year for people above 65 years old.[55]

People with elevated lipid levels and/or ASCVD risk may need lipid levels checked more frequently. The AHA and ACC have recommended measuring fasting lipids 4 to 12 weeks after initiation or dose adjustment of a lipid-lowering medication and every 3 to 12 months thereafter.[48] The AHA and ACC have also recommended measuring fasting lipids before and 4 to 12 weeks after initiation of inflammatory disease-modifying or antiviral medications.

Consideration For Incorporating Into a HTN Visit Workflow

To streamline efforts for patients at risk for CVD, utilize your HTN visits to: ensure that all patients with HTN have had ASCVD risk and lipid assessment within the past year (and within the past 3 months for people with LDL levels ≥160 mg/dL or triglycerides ≥200 mg/dL.

- Ensure that all patients with HTN have had ASCVD risk and lipid assessment within the past year.
- For people with LDL levels ≥160 mg/dL or triglycerides ≥200 mg/dL, review if completed greater than 3 months ago.

Other Management Pearls and Considerations:

For individuals who experience **statin-related myalgias**, consider any of the following to achieve the overall clinical goal of having your patient on maximally-tolerated statin dose.

- Check vitamin D and if low, try pre-statin vitamin D supplementation before statin retrial.
- In addition to statin retrial, consider an altered statin dosing schedule, lower dose of high-intensity statin, trial of hydrophilic rather than lipophilic statin (to theoretically reduce muscle cell entry), or lower intensity statin (without or with altered dosing schedule).

Review for **statin medication interactions**, such as with transplant, immunosuppressants and antivirals (e.g., Paxlovid). Hold statins when prescribing Paxlovid.

Disease processes with chronic inflammation (e.g., autoimmune diseases and chronic human immunodeficiency virus (HIV) infection) along with immunosuppressant, inflammatory disease-modifying, and antiviral medications may all predispose patients to hyperlipidemia and cardiovascular risk.[56] The AHA and ACC have recommended measuring fasting lipids before and 4 to 12 weeks after initiation of inflammatory disease-modifying or antiviral medications.[48]

Statins can generally be used safely in the setting of **cirrhosis** but consider discussion with Hepatology teams when prescribing to patients with liver disease.

The AHA has not confirmed dementia- or hemorrhagic stroke-related concerns of aggressive LDL lowering.[57]

Be aware of **bleeding risks** with icosapent ethyl and discuss with patients, particularly for patients on anticoagulants or antiplatelets.

Some **diets** (e.g., ketogenic diets) may increase LDL and triglyceride levels but are thought to impact larger rather than small particle size LDL; consider discussion with Dietitian teams.

Consider **lipidologist referral** for recalcitrant hyperlipidemia or people with high ASCVD risk and specific limitations to treatment.

APPENDIX G: Effective Treatment of Hyperlipedemia (Cholesterol Medication Reference List)

A medication reference list for lipid-lowering medications is provided below.[43-44,58]

Table 2. Lipid-Lowering medications

First line: Statins		
Class	**Medication (Brand Name), dosing**	**Notes**
High-intensity statins (daily dose lowers LDL by ≥ 50%)	Atorvastatin (Lipitor), 40-80 mg once daily	Lipophilic
	Rosuvastatin (Crestor), 20-40 mg once daily	Hydrophilic
Moderate-intensity statins (daily dose lowers LDL by 30-49%)	Atorvastatin (Lipitor), 10-20 mg once daily	Lipophilic
	Rosuvastatin (Crestor), 5-10 mg once daily	Hydrophilic
	Pravastatin (Pravachol), 40-80 mg once daily	Hydrophilic; short half-life – evening dosing to achieve maximum LDL reduction
	Pitavastatin (Livalo, Zypitamag), 2-4 mg once daily	Lipophilic
	Simvastatin (Zocor), 20-40 mg once daily	Lipophilic; short half-life – evening dosing to achieve maximum LDL reduction
	Lovastatin (Altoprev), maximum LDL reduction 40 mg once daily	
	Fluvastatin (Lescol), XL 80 mg once daily or 40 mg twice daily	
Low-intensity statins (daily dose lowers LDL by < 30%)	Pravastatin (Pravachol), 10-20 mg once daily	Hydrophilic; short half-life – evening dosing to achieve maximum LDL reduction
	Pitavastatin (Livalo, Zypitamag), 1 mg once daily	Lipophilic
	Simvastatin (Zocor), 10 mg once daily	Lipophilic; short half-life – evening dosing to achieve maximum LDL reduction
	Lovastatin (Altoprev), 20 mg once daily	
	Fluvastatin (Lescol), 20-40 mg once daily	
Statin add-on therapies		
Cholesterol absorption inhibitors	Ezetimibe (Zetia), 10 mg once daily	
PCSK9 inhibitors	Alirocumab (Praluent), 75 mg every 2 weeks or 300mg every 4weeks	• Require subcutaneous injection • Discuss with lipidologist, pharmacy, drug company, or insurance teams if challenges due to cost, access, and/or prior authorizations.
	Evolocumab (Repatha), 140 mg every 2 weeks or 420 mg every 4 weeks	
	Inclisiran (Leqvio), 284 mg at 0 months, 3 months, and then every 6 months	
ATP citrate lyase inhibitor	Bempedoic acid (Nexletol) 180 mg once daily	• Risk of ureic acid increase and gout (caution with thiazide diuretics, check uric acid at baseline and during therapy • Risk of tendon rupture (evaluate PMHx and caution with fluoroquinolones) • Serum creatinine elevation • Muscle spasm

Abbreviations: LDL, low-density lipoprotein

APPENDIX G: Effective Treatment of Hyperlipedemia (Cholesterol Medication Reference List)

Table 2. LDL-lowering medications *(continued)*

Salvage therapies if absolute statin intolerance or other contraindications		
Resins	Cholestyramine (Prevalite, Questran), 4-24 g once daily	• May increase serum triglyceride levels; avoid if triglycerides >300 mg/dL • Can bind with other medications and decrease their absorption
	Colesevelam (Welchol), 3.75 g once daily	
	Colestipol (Colestid), Granules: 5-30 g once daily, Tablets: 2-16 g once daily	
Fibrates	Fenofibrate, variable dosing based on brand product	• Require subcutaneous injection • Discuss with lipidologist, pharmacy, drug company, or insurance teams if challenges due to cost, access, and/or prior authorizations.
	Gemfibrozil (Lopid), 600 mg twice daily	
Vitamin	Vitamin B3 (Niacin), variable dosing based on regular, sustained, or extended release	Avoid in patients with dysglycemia

Abbreviations: LDL, low-density lipoprotein

Table 3: Triglyceride-lowering medications

First line: Statins		
Statin Add-On Therapies		
Class	Medication (Brand Name), dosing	Notes
Omega-3 fatty acids	Icosapent ethyl (Vascepa), 2 g twice daily	• Contains 900 mg EPA. • May yield greater improvement towards cardiovascular outcomes. • We recommend caution in patients with bleeding risk.
	Omega-3 acid ethyl esters (Lovaza), 4 g once daily	Contains 460 mg EPA + 380 mg DHA
Salvage therapies: Fibrates, Vitamin B3 (Niacin)		

Abbreviations: EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid

Table 4: Combination lipid-lowering medications

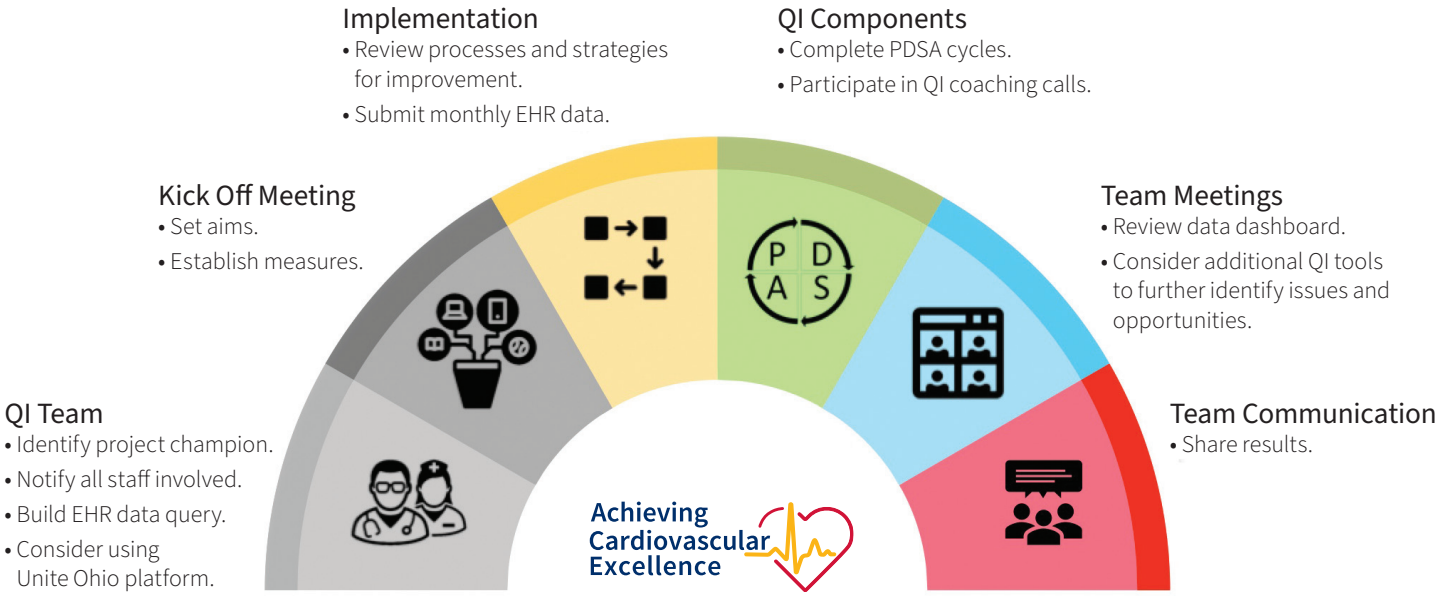
Medication (Brand Name)
Ezetimibe-simvastatin (Vytorin)
Ezetimibe-rosuvastatin (Roszet)
Amlodipine-atorvastatin (Caduet)

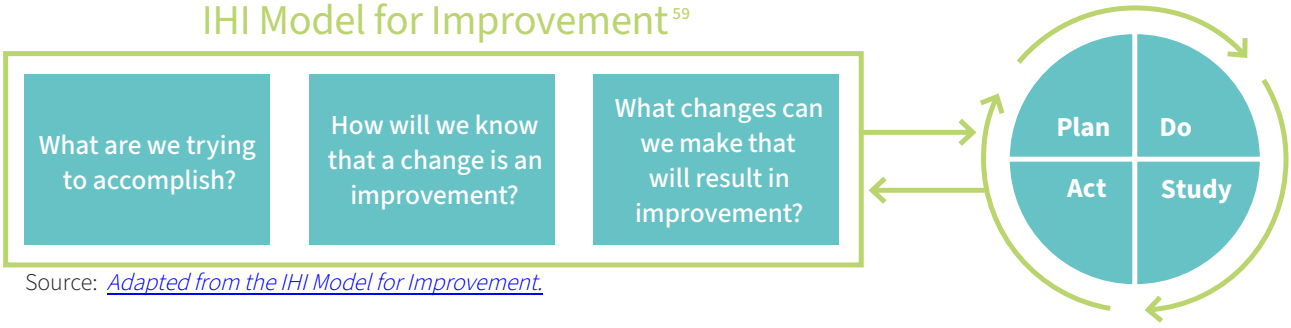
APPENDIX H: QI Engagement and Training

This QI project will utilize the Institute for Healthcare Improvement's (IHI) Model for Improvement and work with clinics to improve cardiovascular health. This is achieved by improving HTN control, addressing CVD risk, such as high cholesterol, and connecting patients with resources to address health-related social needs.

What to Expect

The image below shows some of the collaborative components and how they fit together. The learning process will evolve as strategies are addressed by clinical and QI experts during monthly calls, optional QI coaching is utilized, and best practices are shared with peers. Sites will complete small tests of change utilizing the IHI Model for Improvement to make changes that result in an improvement.





Source: *Adapted from the IHI Model for Improvement.*

Materials adapted with permission from the Ohio Department of Medicaid, originally developed in conjunction with: