

HEARTS

Technical package for cardiovascular disease management in primary health care



Evidence-based treatment protocols



World Health Organization



American Heart Association



CENTRE FOR CHRONIC DISEASE CONTROL



International Diabetes Federation



International Society of Hypertension



RESOLVE
TO SAVE LIVES



WORLD HEART FEDERATION®





Technical package for cardiovascular disease management in primary health care

Evidence-based treatment protocols



WHO/NMH/NVI/18.2

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HEARTS Technical Package

More people die each year from cardiovascular diseases (CVDs) than from any other cause. Over three-quarters of heart disease and stroke-related deaths occur in low- and middle-income countries.

The HEARTS technical package provides a strategic approach to improving cardiovascular health. It comprises six modules and an implementation guide. This package supports Ministries of Health to strengthen CVD management in primary care and aligns with WHO's Package of Essential Noncommunicable Disease Interventions (WHO PEN).

HEARTS modules are intended for use by policymakers and programme managers at different levels within Ministries of Health who can influence CVD primary care delivery. Different sections of each module are aimed at different levels of the health system and different cadres of workers. All modules will require adaptation at country level.

The people who will find the modules most useful are:

- **National level – Ministry of Health NCD policymakers responsible for:**
 - developing strategies, policies and plans related to service delivery of CVD
 - setting national targets on CVD, monitoring progress and reporting.
- **Subnational level – Health/NCD programme managers responsible for:**
 - planning, training, implementing and monitoring service delivery
- **Primary care level – Facility managers and primary health care trainers responsible for:**
 - assigning tasks, organising training and ensuring the facility is running smoothly
 - collecting facility-level data on indicators of progress towards CVD targets.

Target users may vary, based on context, existing health systems and national priorities.

MODULES OF THE HEARTS TECHNICAL PACKAGE				
Module	What does it include?	Who are the target users?		
		National	Subnational	Primary care
H ealthy-lifestyle counselling	Information on the four behavioural risk factors for CVD is provided. Brief interventions are described as an approach to providing counselling on risk factors and encouraging people to have healthy lifestyles.		✓	✓
E vidence-based protocols	A collection of protocols to standardize a clinical approach to the management of hypertension and diabetes.	✓	✓	✓
A ccess to essential medicines and technology	Information on CVD medicine and technology procurement, quantification, distribution, management and handling of supplies at facility level.	✓	✓	✓
R isk-based CVD management	Information on a total risk approach to the assessment and management of CVD, including country-specific risk charts.		✓	✓
T eam-based care	Guidance and examples on team-based care and task shifting related to the care of CVD. Some training materials are also provided.		✓	✓
S ystems for monitoring	Information on how to monitor and report on the prevention and management of CVD. Contains standardized indicators and data-collection tools.	✓	✓	✓



Introduction

In many low- and middle-income countries, there is a wide gap between evidence-based recommendations and current practice. Treatment of major CVD risk factors remains suboptimal, and only a minority of patients who are treated reach their target levels for blood pressure, blood sugar and blood cholesterol.

In other areas, overtreatment can occur with the use of non-evidence-based protocols. The aim of using standard treatment protocols is to improve the quality of clinical care, reduce clinical variability and simplify the treatment options, particularly in primary health care. Standard treatment protocols can be developed by preparing new national treatment guidelines or by adapting or adopting international guidelines.

The *Evidence-based protocols* module uses hypertension and diabetes screening and treatment as an entry point to control cardiovascular risk factors, prevent target organ damage, and reduce premature morbidity and mortality. A comprehensive risk-based approach for integrated management of hypertension, diabetes, and high cholesterol is included in the *Risk-based CVD management* module.

This module includes clinical practice points and sample protocols for:

1. hypertension detection and treatment
2. type 2 diabetes detection and treatment
3. identifying basic emergencies – care and referral.

HEARTS emphasizes adaptation, dissemination, and use of a standardized set of simple clinical-management protocols, which should be drug- and dose-specific, and include a core set of medications. The simpler the protocols and management tools, the more likely they are to be used correctly, and the higher the likelihood that a programme will achieve its goals.

The use of a standardized algorithm is critical to success because it:

- enables task-sharing, with the entire health care team able to support patients
- increases ease of logistics in terms of drug inventory, drug forecasting, and quality monitoring
- enables large reductions in cost of medication
- enables evaluation of impact
- simplifies implementation of changes to protocols, if needed.

Use of module

This module is intended for national policymakers, subnational programme managers and primary health care facility managers who are in the position to adapt these protocols and align to the local context. This ensures that just one protocol is used at the national or in some instances subnational level.

1 Hypertension detection and treatment

All adults should have their blood pressure checked. The treatment protocols provided can be used if the patient is known to have hypertension or is newly diagnosed with hypertension when presenting at the health care facility.

When to measure blood pressure

Measuring blood pressure is the only way to diagnose hypertension, as most people with raised blood pressure have no symptoms.

Blood pressure measurements should be conducted on adults during routine visits to primary health care facilities, including all adults at first presentation to the facility, and, if normal, periodically thereafter (e.g., every 1 to 5 years). Every patient with elevated blood pressure readings requires immediate follow-up, according to the protocol.

Blood pressure measurement and control is particularly important in adults who:

- have had a prior heart attack or stroke
- have diabetes
- have chronic kidney disease (CKD)
- are obese
- use tobacco
- have a family history of heart attack or stroke.

How to measure blood pressure

Effective treatment algorithms for hypertension are dependent on accurate blood pressure measurement. The following advice should be followed for measuring blood pressure (1):

- Use the appropriate cuff size, noting the lines on the cuff to ensure that it is positioned correctly on the arm. (If the arm circumference is >32 cm, use large cuff.)
- Although at the initial evaluation it is preferable to measure blood pressure in both arms and use the arm with the higher reading thereafter, this may not be practical in a busy primary care environment.
- The patient should be sitting with back supported, legs uncrossed, empty bladder, relaxed for 5 minutes and not talking.
- For persons who are getting their blood pressure measured for the first time, it is preferable to take at least two readings and to use the second reading.

Blood pressure can be measured either by a conventional sphygmomanometer, using a stethoscope, or by an automated electronic device. The electronic device, if available, is preferred because it provides more reproducible results and is not influenced by variations in technique or by the bias of the observers.

If the primary health care facility has electricity or regular access to batteries, then consider an automated validated blood pressure device with a digital reading. If the primary health care facility has no electricity or batteries, then a manual BP cuff will have to be used with a stethoscope.

Diagnosing hypertension

The diagnosis of hypertension should be confirmed at an additional patient visit, usually 1 to 4 weeks after the first measurement. In general, hypertension is diagnosed if, on two visits on different days:

systolic blood pressure on both days is ≥ 140 mmHg and/or
diastolic blood pressure on both days is ≥ 90 mmHg.

Hypertension treatment

Who should receive hypertension treatment?

Hypertension treatment is indicated for adults diagnosed with hypertension, as defined above (SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg). Patients with SBP ≥ 160 mmHg or DBP ≥ 100 mmHg may be indicated for immediate treatment based on one assessment.

Lifestyle counselling (healthy diet, physical activity, tobacco use, and harmful use of alcohol) is a critical component of good hypertension management and is often recommended as a first step for patients with blood pressure of SBP 130–139 mmHg and/or DBP 80–89 mmHg (2) who do not have other CVD risk factors. However, in settings where people do not regularly visit the doctor, people who are recommended *only* lifestyle modification may not return for re-evaluation and needed treatment, resulting in uncontrolled hypertension and associated complications. (See *Healthy-lifestyle counselling* module for more information on lifestyle counselling.)

What medications should be used to treat hypertension?

There are four main classes of antihypertensive medications: angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARB), calcium channel blockers (CCB), and thiazide and thiazide-like diuretics. Any of these four classes of antihypertensive medication may be used unless there are specific contraindications. Proper treatment of hypertension usually requires a combination of hypertension medications.

Notes on specific hypertension medications

- Pregnant women and women of childbearing age not on effective contraception should *not* be given ACE inhibitors, ARBs, or thiazide/thiazide-like diuretics; CCBs should be used. If not controlled with intensification dose of medication, refer to specialist.
- Beta blockers are not recommended as first-line therapy. If a heart attack has been diagnosed within the previous three years, or there is atrial fibrillation or heart failure, then a beta blocker should be added to the starting dose of antihypertensive medication. Patients with angina may also benefit from treatment with a beta blocker.

Treatment targets

For most patients, blood pressure is considered controlled when SBP <140 mmHg and DBP <90 mmHg. However, for patients with diabetes or a high risk of CVD, certain guidelines recommend lower targets: SBP <130 mmHg and DBP <80 mmHg.

Other treatment considerations

- If there is a prior heart attack or stroke, or the person is otherwise at high risk of CVD, start a statin at the same time as starting antihypertensive medication. (Statins should not be used in women who are or who may become pregnant.)
- If there is a prior heart attack or ischemic stroke, start low-dose aspirin.
- The hypertension protocols included in this module serve well for initiation and maintenance of successful treatment. If there are serious adverse events, lack of control of blood pressure, or if a major medical event intervenes, then referral to a specialist will be needed.
- If the patient is already on another medication regimen, blood pressure is controlled to the target level, and the medications the patient is taking are accessible and affordable, there is no reason to change the regimen.
- If the patient feels faint on standing, check blood pressure while standing. If the systolic blood pressure is consistently less than 110 mm Hg in a patient on medical treatment, consider reducing the dosage or number of medications used.

Treatment adherence

Adherence to treatment is critical for blood pressure control. If antihypertensive medication is being prescribed, the following are critical to ensuring adherence:

- Teach the patient how to take the medications at home.
- Explain the difference between medicines for long-term control (for example, of blood pressure) and medicines for quick relief (such as for headaches).
- Explain the reason for prescribing the medicine(s).
 - Explain the diagnosis of hypertension.
 - Discuss the asymptomatic nature of hypertension and explain that medications must be taken even if there are no symptoms.
 - Inform patient of the complications of untreated hypertension, including stroke, heart attack, kidney failure.
 - Explain the disability and economic and family burden these preventable complications cause.
- Show the patient the appropriate dose.
- Explain how many times a day the patient should take the medication and at what time, and adopt the following simple steps to help them to adhere to the guidelines:
 - Label and package the tablets.
 - Check the patient's understanding before the patient leaves the health centre.
 - Wherever possible, use once-daily dosages of all medications, to be given at the same time each day.

- Explain how important it is for the patient to:
 - Keep an adequate supply of medications safely at home.
 - Take the medicines regularly as advised, even if there are no symptoms.
- Explain potential adverse effects of the medications and what to do if the patient experiences them.

Sample hypertension treatment protocols

The following pages outline sample protocols for managing hypertension, each with a different starting medication. Each programme/country should select and then adapt the option that best suits their circumstances.

This series of sample protocols represents a range of possible approaches to managing hypertension. Depending on the local preferences, influenced by usual practice, resources and demography, countries may select one or more protocols from this sample to adapt.

To assist in the selection of the most suitable option, a non-comprehensive list of advantages and disadvantages is presented in a box relating to each protocol. Selection of a single option greatly facilitates logistics, training, supervision, evaluation, and overall programme implementation. The simpler the protocol, the more likely it is to be followed and to achieve the programme objective.

The following sample hypertension protocols have been endorsed by the:

World Hypertension League and the International Society of Hypertension

1. Diuretic as first-line treatment (3–11)
2. CCB as first-line treatment (5, 6, 9, 12–17)
3. ACE-I or ARB as first-line treatment (5, 6, 9, 10, 12, 13, 18–21)
4. ACE-I or ARB + CCB as first-line treatment (5, 6, 12, 13, 15, 22)
5. CCB + diuretic as first-line treatment (5, 6, 13, 14)
6. ACE-I or ARB+ diuretic as first-line treatment (5–7, 13, 14, 22–25)

The following sample protocol has been endorsed by the:

World Heart Federation

7. Use of BP-lowering drugs in patients with ischaemic CVD (5, 6, 9, 10, 12, 13, 18–21)

The following sample hypertension protocols have been adapted and endorsed by:

Resolve to Save Lives

8. Adapted example: CCB as first-line treatment (26)
9. Adapted example: telmisartan 40 mg/amlodipine 5 mg single-pill combination regimen (26)

Box 1: Advantages and disadvantages of diuretics

Advantages of diuretics

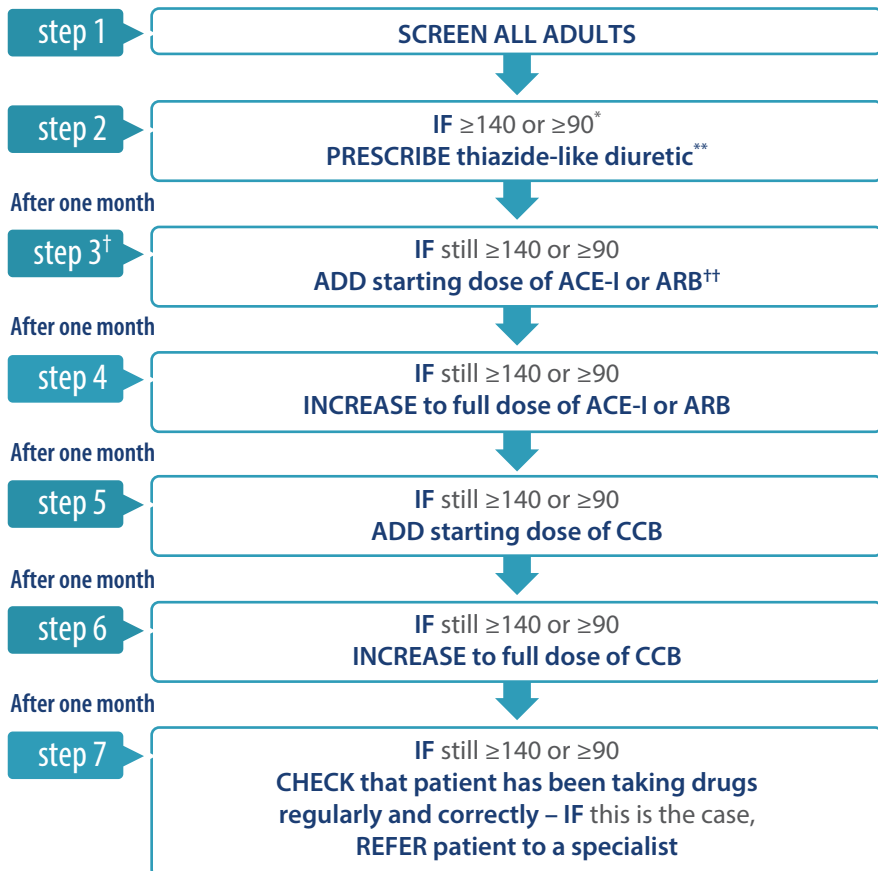
- May be less expensive than other hypertension medications;
- Probably effective for all races.

Disadvantages:

- Risk of hypokalemia;
- Has unfavourable effects on lipid and glucose measurements; clinical significance unclear.

HYPERTENSION PROTOCOL

Diuretic as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

▶ **THIS PROTOCOL IS CONTRAINDICATED FOR WOMEN WHO ARE OR COULD BECOME PREGNANT.**

- Manage diabetes as indicated by national protocol.
- Aim for BP $< 130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES[¥]

Class	Medication	Starting dose	Intensification dose
diuretic [‡] thiazide-like	chlorthalidone [§]	12.5 mg	25 mg
	or indapamide SR [§]	1.5 mg	stay at 1.5 mg
ACE inhibitor [‡] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [‡]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg

* Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

** Consider statin use. Consider increase to intensification dose diuretic. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

† Consider optional switch of steps 3 and 4 (ACE-I) with steps 5 and 6 (CCB).

†† ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

¥ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

‡ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

§ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 2: Advantages and disadvantages of CCBs

Advantages:

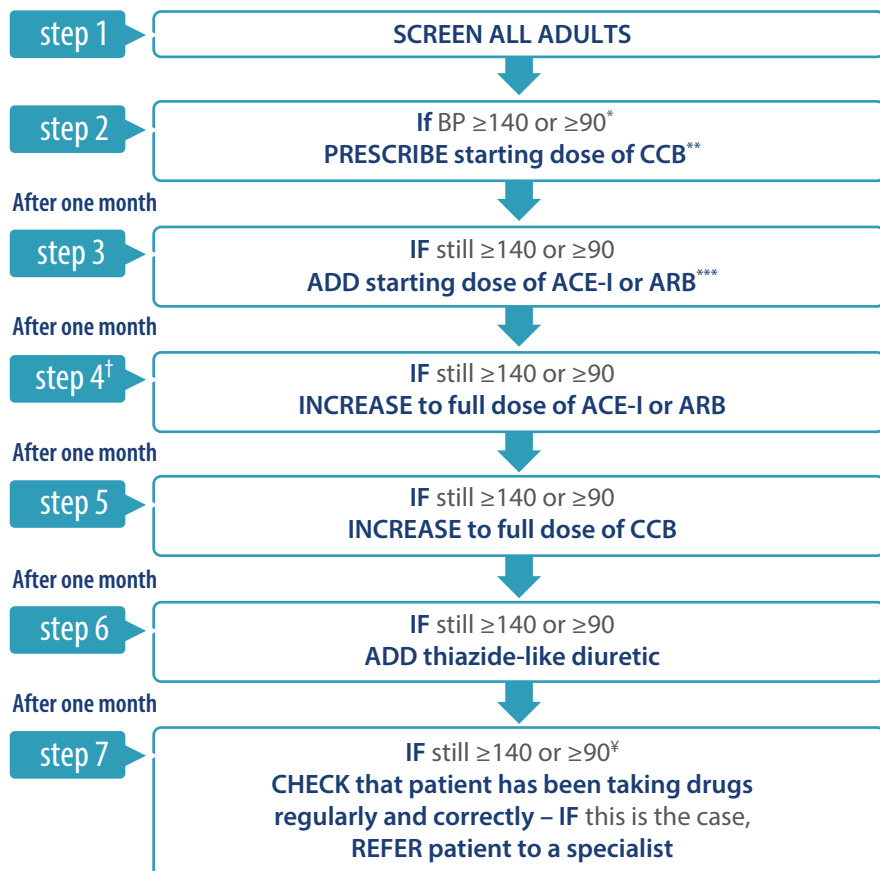
- Probably effective for all races;
- Reduces need for monitoring of electrolytes and renal function;
- Avoids need for different treatment for women of childbearing age who may become pregnant.

Disadvantages:

- May be more expensive than diuretics;
- Ankle edema may occur in up to 10% of patients, particularly with intensification dose in the absence of an ACE-inhibitor or ARB.

HYPERTENSION PROTOCOL

CCB as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

- Manage diabetes as indicated by national protocol.
- Aim for BP $< 130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES[§]

Class	Medication	Starting dose	Intensification dose
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg
ACE inhibitor [§] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [§]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
diuretic [§] thiazide-like	chlorthalidone [¶] or indapamide SR [¶]	12.5 mg	25 mg
		1.5 mg	stay at 1.5 mg

* Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

** Consider statin use. Consider increasing to intensification dose CCB before introducing ACE-I/ARB.

*** ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

† Consider optional switch of steps 3 and 4 (ACE-I) with step 6 (thiazide-like diuretic).

¥ Consider increase to full dose diuretic. Hypokalaemia more common using full dose diuretic – consider increased lab monitoring.

‡ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

§ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

¶ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 3: Advantages and disadvantages of ACE inhibitors

Advantages:

- Benefits some patients with kidney disease, prior myocardial infarction, and low ejection fraction.

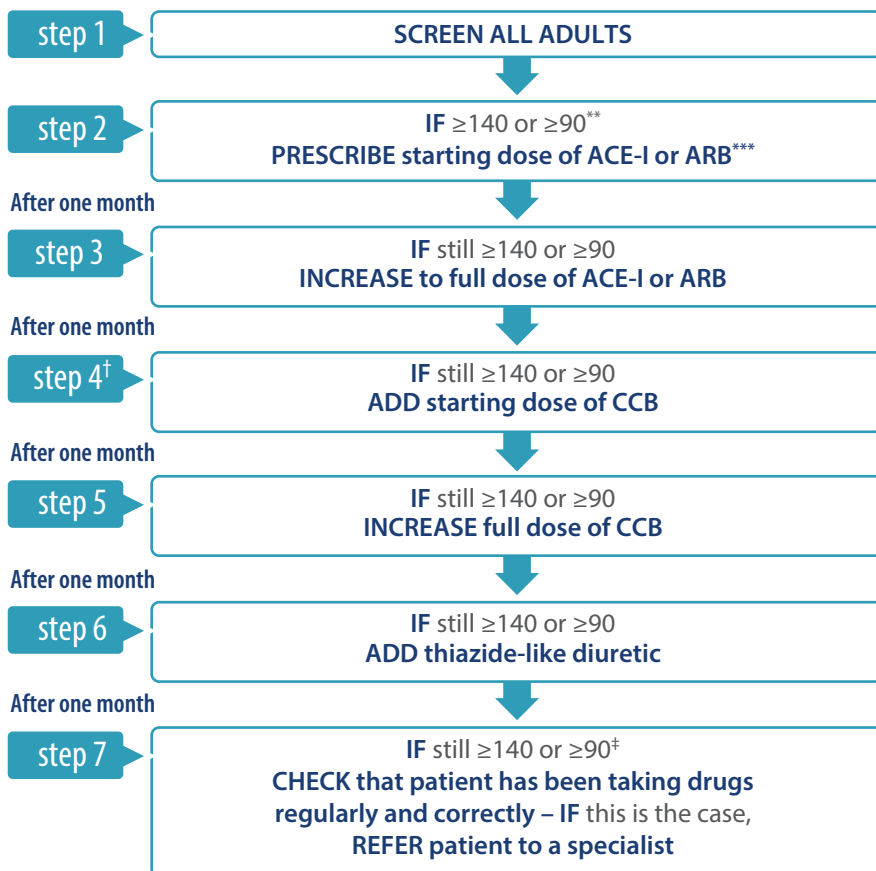
Disadvantages:

- May be more expensive than other hypertension medications;
- A persistent cough is experienced by up to 10% of patients treated with an ACE inhibitor (not observed with ARBs); this risk is higher in people of African descent;
- Less effective as single medication in people of African descent;
- Small risk of angioedema; risk is higher in people of African descent (not observed with ARBs);
- ACE inhibitors (and ARBs) should NOT be given to women who are or who may become pregnant;
- Risk of hyperkalemia, especially if patient has CKD.

Note: Research suggests that ARBs may have effectiveness similar to ACE inhibitors.

HYPERTENSION PROTOCOL

ACE-I or ARB* as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

▶ **THIS PROTOCOL IS CONTRAINDICATED FOR WOMEN WHO ARE OR COULD BECOME PREGNANT.**

- Manage diabetes as indicated by national protocol.
- Aim for BP $<130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES[¥]

Class	Medication	Starting dose	Intensification dose
ACE inhibitor [§] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [§]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
diuretic [§] thiazide-like	chlorthalidone [‡] or indapamide SR [‡]	12.5 mg	25 mg
		1.5 mg	stay at 1.5 mg
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg

* ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

** Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

*** Consider statin use.

† Consider optional switch of steps 4 and 5 (CCB) with step 6 (thiazide-like diuretic).

‡ Consider increase to intensification dose diuretic. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

¥ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

§ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

‡ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 4: Advantages and disadvantages of ACE inhibitors plus CCBs

Advantages:

- Single-pill combination medication increases ease of logistics and reduces patient barriers;
- Reduces the number of steps in the protocol, increasing the likelihood of control of blood pressure;
- Reduces number of pills and increases adherence as most patients will require multiple anti-hypertensive medications;
- Benefits some patients with kidney disease, prior myocardial infarction, and low ejection fraction;
- Reduced incidence of ankle edema compared to CCB use without ACE-inhibitors or ARBs.

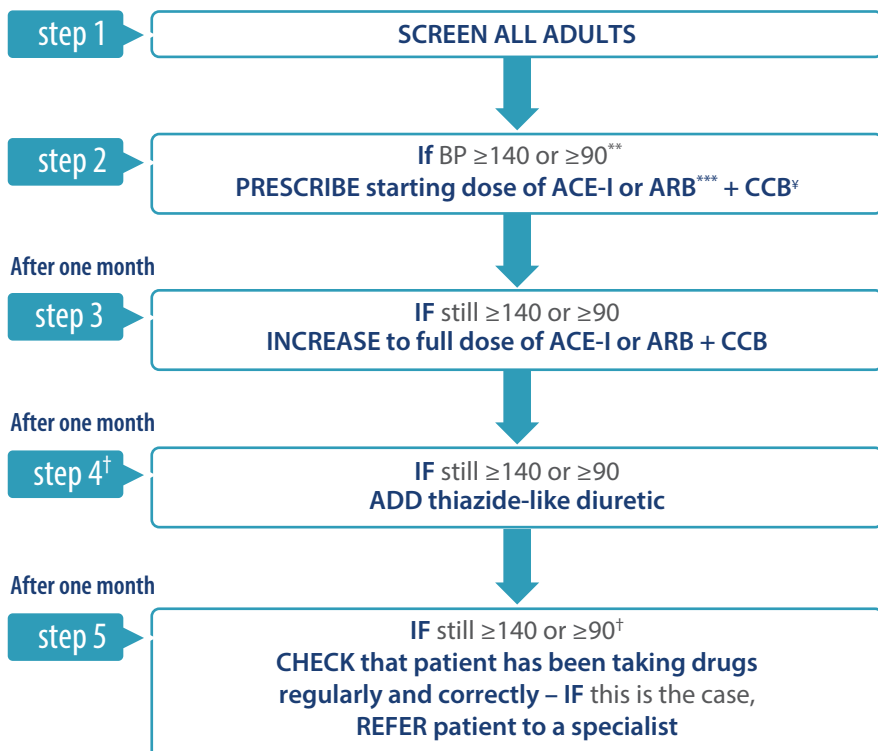
Disadvantages:

- Single-pill combination therapy may be more expensive than other hypertension medications given as single agent drugs;
- Not all patients would have required both medications;
- A persistent cough is experienced by up to 10% of patients treated with an ACE inhibitor; risk is higher in people of African descent;
- Small risk of angioedema; risk is higher in people of African descent;
- ACE inhibitors (and ARBs) should NOT be given to women who are or who may become pregnant;
- Risk of hyperkalemia, especially if patient has CKD.

Note: Research suggests that ARBs may have effectiveness similar to ACE inhibitors.

HYPERTENSION PROTOCOL

ACE-I or ARB* + CCB as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

▶ **THIS PROTOCOL IS CONTRAINDICATED FOR WOMEN WHO ARE OR COULD BECOME PREGNANT.**

- Manage diabetes as indicated by national protocol.
- Aim for BP $< 130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES‡

Class	Medication	Starting dose	Intensification dose
ACE inhibitor [§] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [§]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg
diuretic [§] thiazide-like	chlorthalidone [¶] or indapamide SR [¶]	12.5 mg 1.5 mg	25 mg stay at 1.5 mg

* ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

** Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

*** Consider statin use.

¥ The two medications can be used as two free agents or as a single pill combination (SPC), accordingly.

† Consider increase to intensification dose diuretic. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

‡ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

§ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

¶ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 5: Advantages and disadvantages of CCBs and diuretics

Advantages:

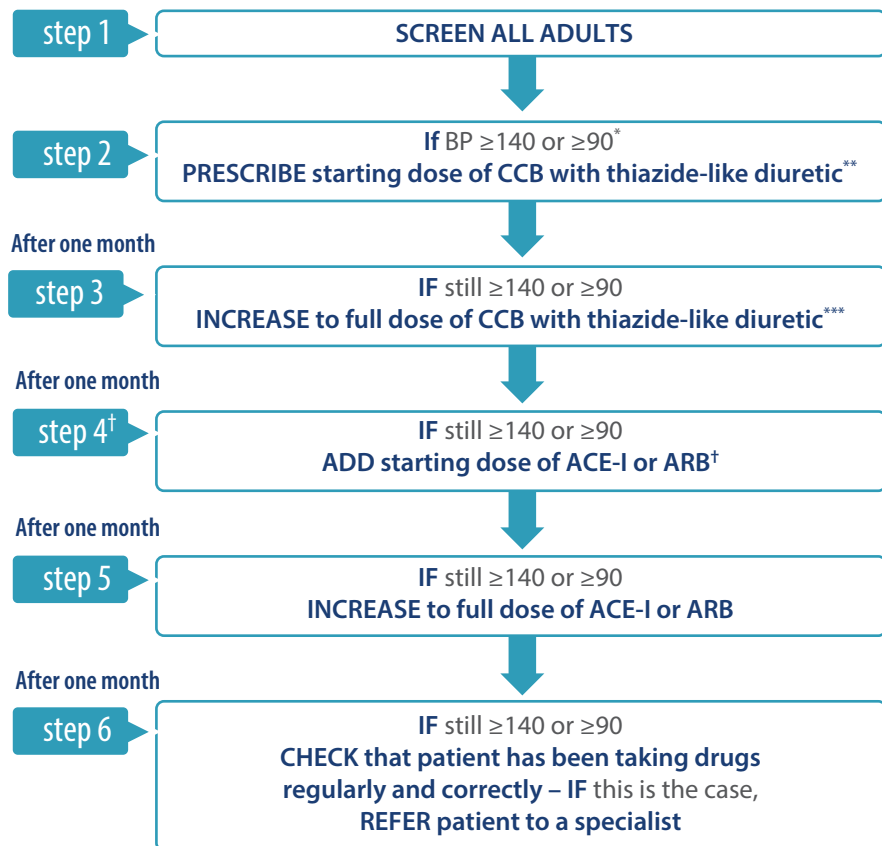
- Single-pill combination medication increases ease of logistics and reduces patient barriers;
- Reduces the number of steps in the protocol, increasing the likelihood of control of blood pressure;
- Reduces number of pills and increases adherence as most patients will require multiple anti-hypertensive medications;
- Probably effective for all races; may be more effective than other combinations in people of African descent.

Disadvantages:

- Single-pill combination therapy may be more expensive than other hypertension medications given as single agent drugs;
- Not all patients would have required both medications;
- Risk of hypokalemia;
- Diuretics have unfavourable effects on lipid/glucose measurements; clinical significance unclear;
- Ankle edema may occur in up to 10% of patients, particularly with intensification dose in the absence of ACE-inhibitors or ARBs.

HYPERTENSION PROTOCOL

CCB + diuretic as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

- Manage diabetes as indicated by national protocol.
- Aim for BP $< 130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES[‡]

Class	Medication	Starting dose	Intensification dose
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg
diuretic [§] thiazide-like	chlorthalidone [‡]	12.5 mg	25 mg
	or indapamide SR [‡]	1.5 mg	stay at 1.5 mg
ACE inhibitor [§] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [§]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg

* Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

** Consider statin use.

*** Consider increasing to intensification dose of thiazide-like diuretic. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

† ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

‡ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

§ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

‡ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 6: Advantages and disadvantages of ACE inhibitor plus diuretic

Advantages:

- Single-pill combination medication increases ease of logistics and reduces patient barriers;
- Reduces the number of steps in the protocol, increasing the likelihood of control of blood pressure;
- Reduces number of pills and increases adherence as most patients will require multiple anti-hypertensive medications;
- Likely to be effective for all races;
- Use of ACE inhibitor reduces risk of hypokalemia with diuretic;
- ACE inhibitors benefit some patients with kidney disease, prior myocardial infarction, and low cardiac ejection fraction.

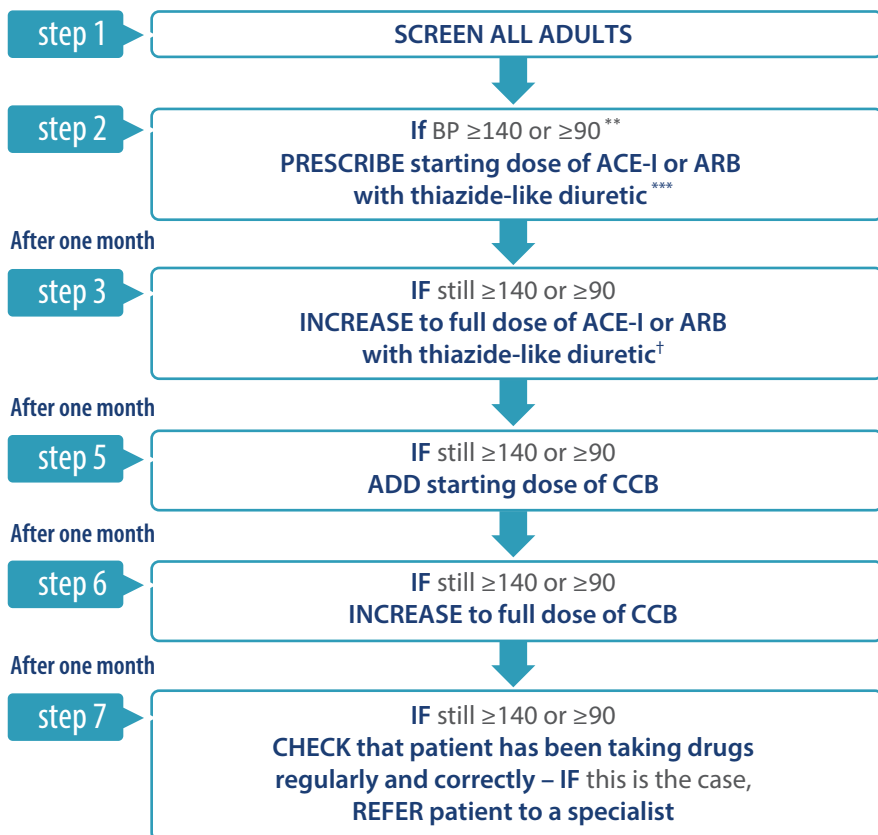
Disadvantages:

- Single-pill combination therapy may be more expensive than other hypertension medications given as single agent drugs;
- Not all patients would have required both medications;
- Up to 10% of patients treated with an ACE inhibitor experience a persistent cough; risk is higher among people of African descent;
- There is a small risk of angioedema with an ACE inhibitor; this risk is higher among people of African descent;
- Risk of hyperkalemia, especially if patient has CKD, but less than when ACE inhibitor or ARB used without diuretic;
- ACE inhibitors (and ARBs) should NOT be given to women who are or who may become pregnant;
- Diuretic has unfavourable effects on lipid/glucose measurements; clinical significance unclear.

Notes: Research suggests that ARBs may have effectiveness similar to ACE inhibitors.

HYPERTENSION PROTOCOL

ACE-I or ARB* + diuretic as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

▶ **THIS PROTOCOL IS CONTRAINDICATED FOR WOMEN WHO ARE OR COULD BECOME PREGNANT.**

- Manage diabetes as indicated by national protocol.
- Aim for BP $< 130/80$ for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES ‡

Class	Medication	Starting dose	Intensification dose
ACE inhibitor [§] (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB [§]	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
diuretic [§] thiazide-like	chlorthalidone [¶] or indapamide SR [¶]	12.5 mg	25 mg
		1.5 mg	stay at 1.5 mg
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg

* ACE-I or ARB according to local guidelines/costs/intolerance to ACE-I. ACE-Inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women.

** Or other BP target, as determined by clinical factors. If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–100, check on a different day and if still elevated, start.

*** Consider statin use.

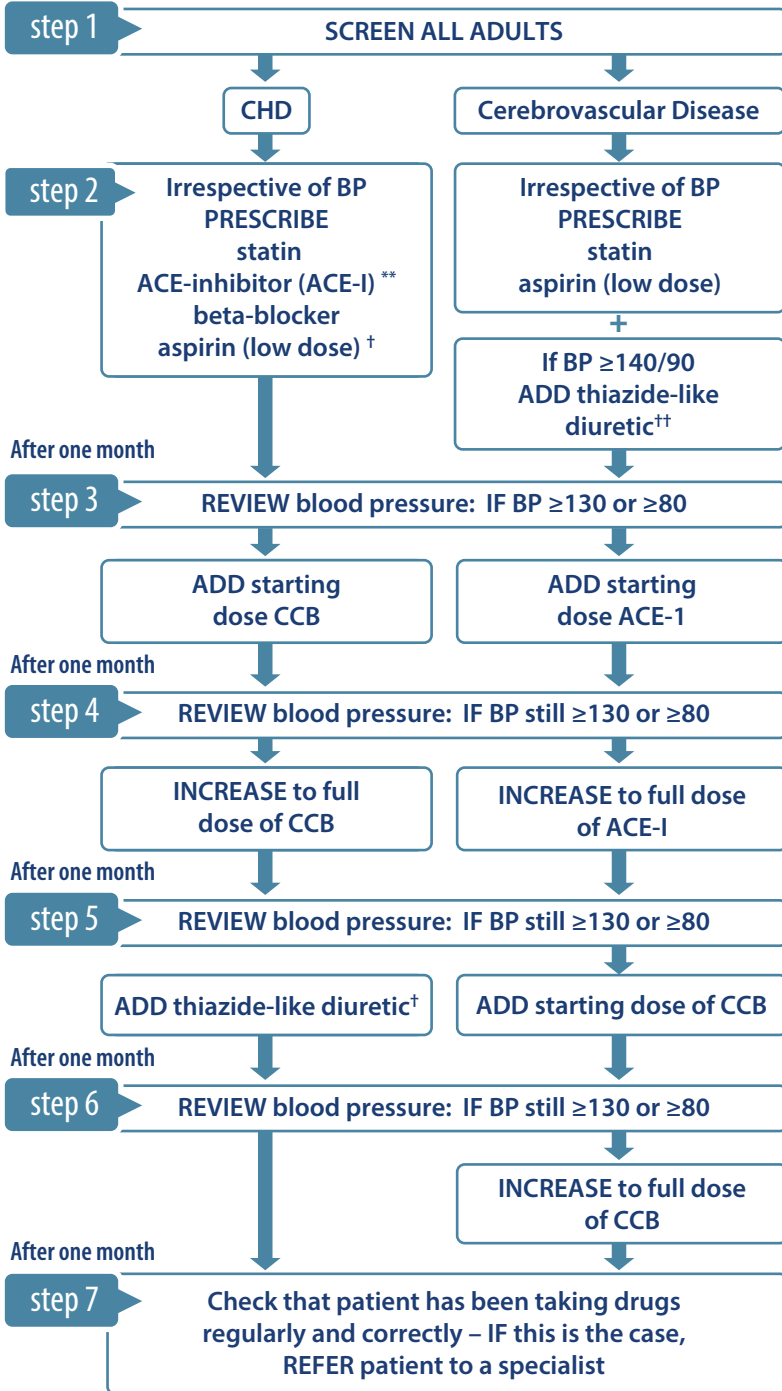
† Consider increasing to intensification dose of thiazide-like diuretic. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

‡ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.

§ Before initiating and several weeks after starting ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.

¶ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Use of BP-lowering drugs in patients with ischaemic CVD*



PROVISION FOR SPECIFIC PATIENTS

- Manage diabetes as indicated by national protocol.
 - Aim for BP <130/80 for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD.
- People with history of atrial fibrillation or heart failure and cerebrovascular disease:
- Add beta blocker with initial treatment

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Drink no more than two units of alcohol per day and do not drink on at least two days of the week.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat a low-salt diet.
 - Eat ≥5 servings of vegetables/fruit per day.
 - Use healthy oils (e.g. olive, safflower).
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids (e.g., flax seeds) at least twice a week.
 - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.

DRUGS AND DOSES ‡

Class	Medication	Starting dose **	Intensification dose
ACE inhibitor § (angiotensin-converting-enzyme inhibitor)	lisinopril	20 mg	40 mg
	ramipril	5 mg	10 mg
	perindopril	4–5 mg	8–10 mg
ARB §	losartan	50 mg	100 mg
	telmisartan	40 mg	80 mg
diuretic § thiazide-like	chlorthalidone ¶	12.5 mg	25 mg
	or indapamide SR ¶	1.5 mg	stay at 1.5 mg
CCB (calcium channel blocker)	amlodipine	5 mg	10 mg

* Ischaemic Stroke/TIA/Myocardial Infarction ≥1 month ago.
 ** ACE-Inhibitors cause chronic cough in approximately 10% of patients. If not tolerated, give an ARB. Neither ACE-I nor ARBs should be given to pregnant women.
 † When BP <140/90, ACE inhibitor and beta-blocker should be added unless symptoms preclude.
 †† Consider increasing to intensification dose of thiazide-like diuretic before further titration. Hypokalaemia more common using intensification dose diuretic – consider increased lab monitoring.

‡ These are suggested examples of medications based on scientific evidence, once-daily suitability, common usage, and availability.
 § Before initiating ACE-Is, ARBs or diuretics, consider checking serum creatinine and potassium.
 ¶ If neither diuretic agent is available, hydrochlorothiazide can be used (25 mg starting, 50 mg full) or indapamide (1.25 mg starting, 2.5 mg full) can be used.

Box 7: Advantages and disadvantages of CCB as first-line treatment

Advantages:

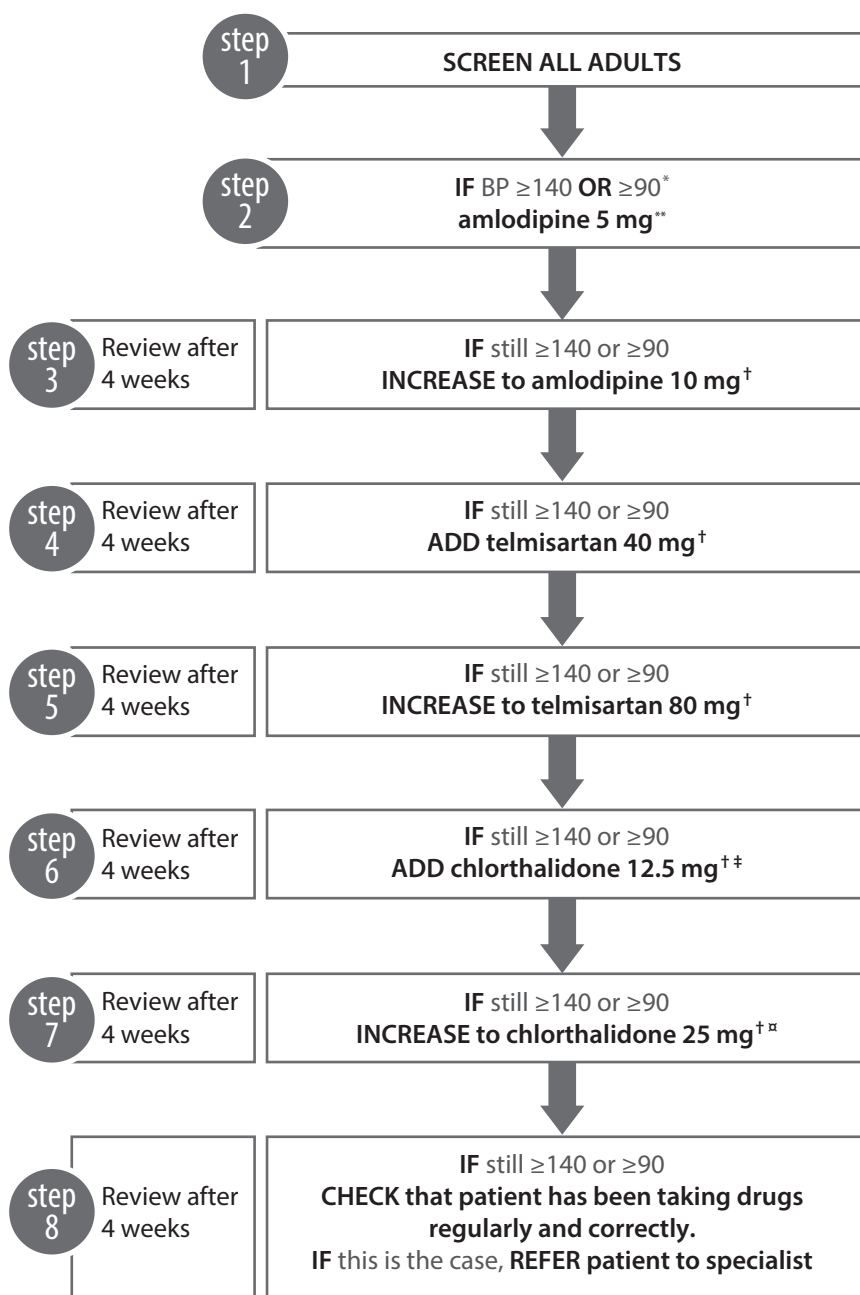
- Probably effective for all races;
- Reduces need for monitoring of electrolytes and renal function;
- Avoids need for different treatment for women of childbearing age who may become pregnant.

Disadvantages:

- May be more expensive than diuretics;
- Ankle edema may occur in up to 10% of patients, particularly with intensification dose in the absence of ARBs or ACE-inhibitors.

HYPERTENSION PROTOCOL

Adapted example: CCB as first-line treatment



PROVISION FOR SPECIFIC PATIENTS

- Manage diabetes as indicated by national protocol
- Aim for BP <130/80 for people with diabetes or otherwise at high risk
- Start statin and aspirin in people with prior heart attack or ischemic stroke
- Start beta blocker in people with heart attack in past 3 years
- Consider statin in people at high risk

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Avoid unhealthy alcohol intake.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat less than 1 teaspoon of salt per day.
 - Eat ≥5 servings of vegetables/fruit per day.
 - Use healthy oils.
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids at least twice a week.
 - Avoid added sugar.

* If BP ≥160 or ≥100, start same day. If 140–159 or 90–99, check on a different day, and if still elevated, start.

** Smaller, fragile patients should be started on 2.5 mg per day. Alternatively, amlodipine can be replaced with a thiazide diuretic (e.g., chlorthalidone 12.5 mg, indapamide 1.25 mg, or indapamide SR 1.5 mg; if neither chlorthalidone nor indapamide is available, hydrochlorothiazide 25 mg) or a once-daily angiotensin receptor blocker (ARB) (e.g., telmisartan 40 mg or losartan 50 mg) or once daily angiotensin converting enzyme inhibitor (ACE-I) (e.g., lisinopril 20 mg, ramipril 5 mg, perindopril 4 mg). ACE-I and ARB should NOT be given to women who are or who may become pregnant. Before initiating and several weeks after starting a thiazide diuretic, ACE-I, or ARB, check serum creatinine and potassium if possible.

† If systolic BP repeatedly ≤110, consider going to prior, less intensive regimen.

‡ Indapamide can be used if chlorthalidone is not available (1.25 mg starting dose, 2.5 mg intensification; for indapamide SR 1.5 mg, do not increase dose at Step 7). Hydrochlorothiazide can be used if neither of the other diuretic agents is available (25 mg starting dose, 50 mg intensification).

▫ Hypokalemia is more common using full-dose diuretic – consider regular lab monitoring. If a diuretic is used instead of amlodipine in the initial treatment, this consideration would apply earlier in the protocol.

Box 8: Advantages and disadvantages of telmisartan 40 mg/amlodipine 5 mg single-pill combination regimen as first-line treatment

Advantages:

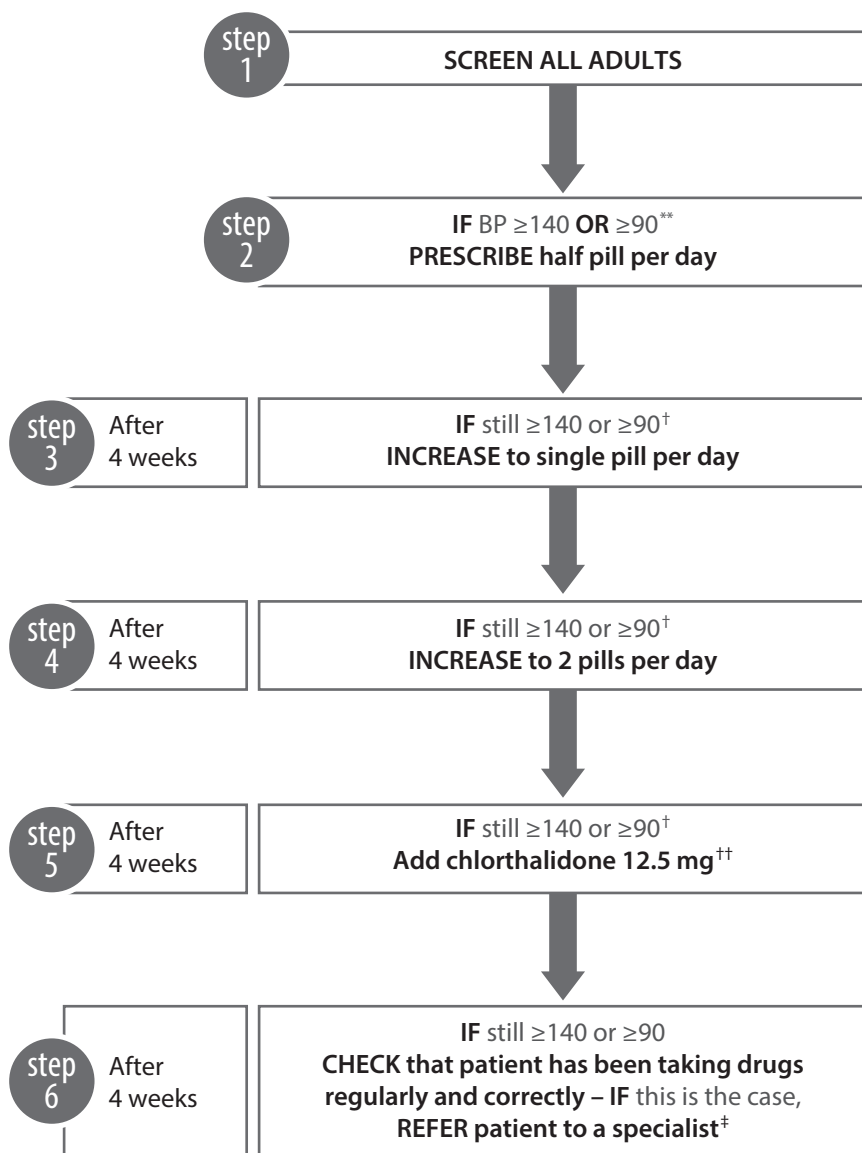
- Single-pill combination medication increases ease of logistics and reduces patient barriers;
- Reduces the number of steps in the protocol, increasing the likelihood of control of blood pressure;
- Reduces number of pills and increases adherence as most patients will require multiple anti-hypertensive medications;
- Benefits some patients with kidney disease, prior myocardial infarction, and low ejection fraction;
- Reduced incidence of ankle edema compared to amlodipine use without telmisartan (or other ARBs and ACE-inhibitors).

Disadvantages:

- Single-pill combination therapy may be more expensive than other hypertension medications given as single agent drugs;
- Not all patients would have required both medications;
- Telmisartan (as well as other ARBs and all ACE-inhibitors) should NOT be given to women who are or who may become pregnant;
- Risk of hyperkalemia, especially if patient has CKD.

HYPERTENSION PROTOCOL

Adapted example: telmisartan 40 mg* / amlodipine 5 mg[§] single-pill combination[¥] regimen



PROVISION FOR SPECIFIC PATIENTS

- Manage diabetes as indicated by national protocol
- Aim for BP $< 130/80$ for people with diabetes or otherwise at high risk
- Start statin and aspirin in people with prior heart attack or ischemic stroke
- Start beta blocker in people with heart attack in past 3 years
- Consider statin in people at high risk

LIFESTYLE MANAGEMENT ADVICE FOR ALL PATIENTS

- Stop all tobacco use, avoid secondhand tobacco smoke.
- Avoid unhealthy alcohol intake.
- Increase physical activity to equivalent of brisk walk 150 minutes per week.
- If overweight, lose weight.
- Eat heart-healthy diet:
 - Eat less than 1 teaspoon of salt per day.
 - Eat ≥ 5 servings of vegetables/fruit per day.
 - Use healthy oils.
 - Eat nuts, legumes, whole grains and foods rich in potassium.
 - Limit red meat to once or twice a week at most.
 - Eat fish or other food rich in omega 3 fatty acids at least twice a week.
- Avoid added sugar.

* Telmisartan 40 mg can be replaced with any once-daily angiotensin receptor blocker (ARB) (e.g., losartan 50 mg) or once daily angiotensin converting enzyme inhibitor (ACE-I) (e.g., lisinopril 20 mg, ramipril 5 mg, perindopril 4 mg). ACE-I and ARB should NOT be given to women who are or who may become pregnant. Before initiating and several weeks after starting ACE-Is or ARBs check serum creatinine and potassium if possible.

§ Amlodipine can be replaced with another once-daily dihydropyridine calcium channel blockers. Alternatively, amlodipine can be replaced with

chlorthalidone 12.5 mg, indapamide 1.25 mg, or indapamide SR 1.5 mg. If neither chlorthalidone nor indapamide is available, hydrochlorothiazide 25 mg can be used. If a diuretic is used instead of amlodipine, check serum potassium if possible and see ‡ below.

¥ Medications can be used as individual agents if single-pill combinations are not available.

** If BP ≥ 160 or ≥ 100 , start same day. If 140–159 or 90–99, check on a different day, and if still elevated, start.

† If systolic BP repeatedly < 110 , consider going to prior, less intensive regimen.

†† If a diuretic is used initially instead of amlodipine, then amlodipine or another once-daily dihydropyridine calcium channel blocker would be used at this step.

‡ Consider increase to full-dose diuretic (chlorthalidone 25 mg or indapamide 2.5 mg; indapamide SR 1.5 mg is both the start and the full dose). Hypokalemia is more common using full-dose diuretic – consider regular lab monitoring. If a diuretic is used instead of amlodipine in the initial treatment, this consideration would apply earlier in the protocol.

2 Diabetes detection and treatment

Treatment protocols are for patients in the primary care setting with established or newly diagnosed type 2 diabetes and are derived from the WHO Package of Essential NCD interventions (27).

Diabetes risk factors and symptoms

Risk factors for type 2 diabetes include:

- overweight/obesity
- physical inactivity
- having a first-degree relative with diabetes
- history of gestational diabetes, or preeclampsia
- history of CVD, HTN, dyslipidaemia, or polycystic ovary syndrome.

On average, people have type 2 diabetes (with or without symptoms) for between five and seven years before it is diagnosed. Symptoms of diabetes include:

- polyuria (excessive passing of urine)
- polydipsia (excessive thirst)
- unexplained weight loss
- polyphagia (excessive hunger)
- vision changes
- fatigue.

Diagnostic testing for diabetes

Test adults who are 40+ years old and who are overweight (BMI >25) or obese (BMI >30)* (28), or follow national guidelines.

Fasting plasma glucose (FPG) is the most practical test for low-resource settings, given its low cost**. HbA1c can also be used, but it is considerably more costly.

Plasma glucose two hours after a 75 g oral glucose load (OGTT) can also be used to screen for and diagnose diabetes, but is less practical and more costly.

If patient is not fasting and has symptoms, a random plasma glucose (RPG) test can also be performed. It is the least accurate of the diagnostic tests. It is useful to confirm the diagnosis in person with symptoms; however, a negative test does not rule out the diagnosis of diabetes.

* Calculate body mass index (BMI, kg/m²) in all adults. For some populations (e.g., South Asian), weight-associated risks similar to those at a BMI of 25 in Caucasian populations are found at a BMI of approximately 23, and intensify at a BMI of approximately 28.

** Point of care devices can be used in diagnosing diabetes if laboratory services are not available.

Diagnostic values:

Test	mmol/l	mg/dl
Fasting blood sugar (FBS)*	≥7	≥126
Random plasma glucose (RPG)	≥11.1	≥200
Plasma glucose two hours after a 75 g oral glucose load-OGTT	≥11.1	≥200
	mmol/mol	%
Haemoglobin A1c	≥48	≥6.5%

Drug therapy

Control of blood glucose

Metformin is recommended as the first-line drug in the treatment of diabetes. Sulfonylurea is recommended as the second-line treatment, and human insulin as the third-line treatment.

Patients may require two or three drugs. Although there are other drug classes usually used as second- and third-line treatment, including thiazolidinediones (TZDs), DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 receptor agonists, these medicines tend to be more costly than metformin, sulfonylurea and insulin, with currently limited evidence of superior effectiveness. They may, however, be considered in the rare cases when treatment with metformin, sulfonylurea, and insulin is not possible. Insulin treatment should be introduced and monitored according to national practices.

Control of blood pressure and blood lipids

Hypertension treatment is indicated when SBP ≥130 and/or DBP ≥80). Statins are recommended for all people with type 2 diabetes older than 40 years, but only if this does not negatively impact access to glucose-lowering and blood pressure-lowering medication.

Monitoring glycaemic control

If diabetes is diagnosed, monitor glycaemic control every three months until diabetes is controlled, then every six months after that.

HbA1c is the most accurate measurement of long-term glycaemic control and represents the average blood glucose over the previous two to three months. HbA1c < 7% is generally considered to be adequate glycaemic control. In people with frequent severe hypoglycaemia, severe complications and low life-expectancy, the goal for HbA1c could be relaxed, e.g. to <8%.

Fasting plasma glucose (FPG) can also be used to monitor control.

Goal for glycaemic control	Plasma glucose
Fasting	≤7.0 mmol/l (126mg/dl)

* Fasting: no food and only water for 8–14 hours or more before the test.

Clinical practice recommendations

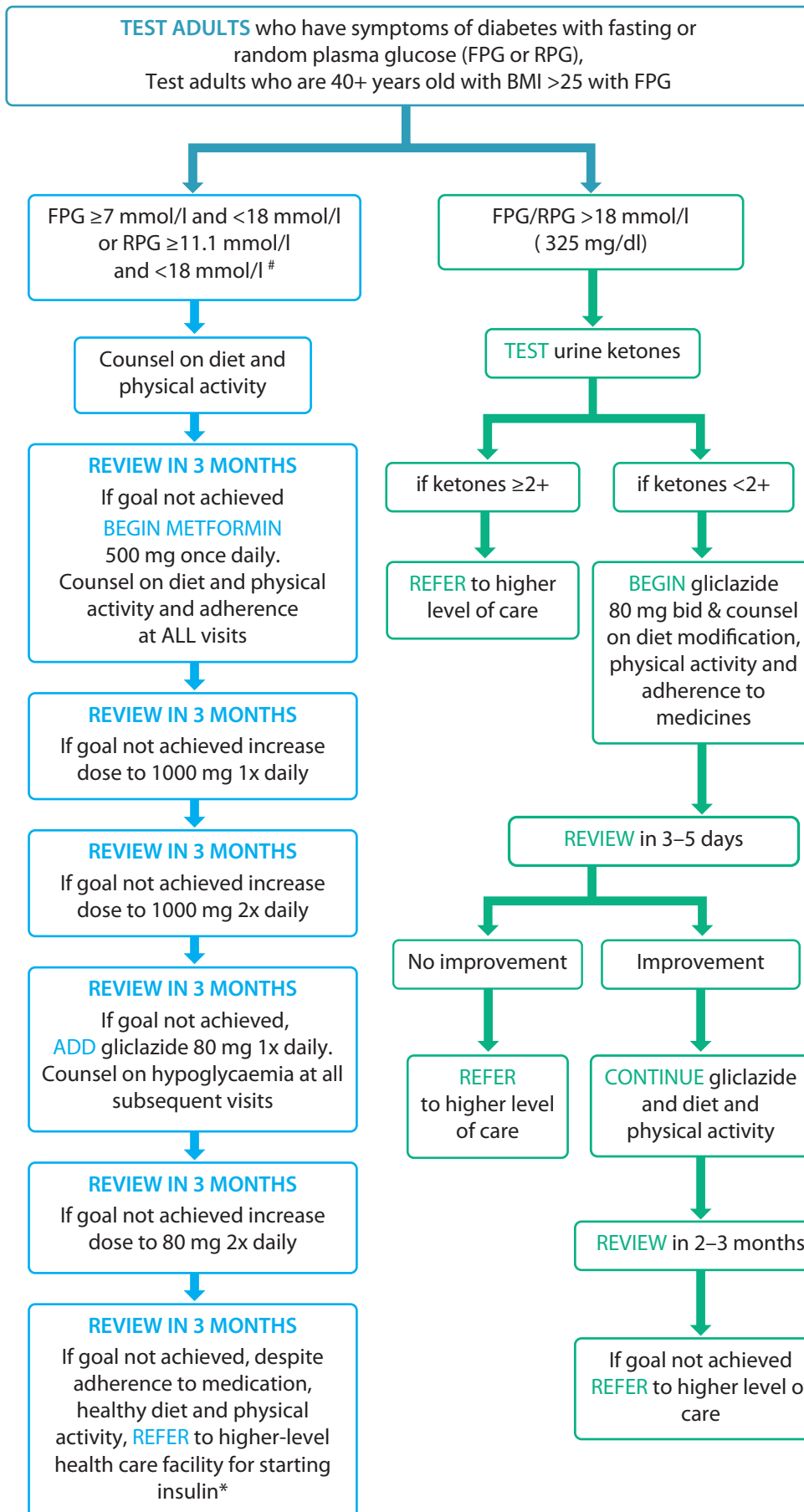
- Provide counselling around lifestyle change, including diet, physical activity and smoking cessation (see *Healthy-lifestyle counselling*).
- Initiate diabetes self-management education to reinforce treatment goals.
- Prescribe aspirin for patients with CVD.
- Measure blood pressure at every visit. Treat as per hypertension protocol if $\geq 130/80$ mmHg. **Note:** if 130/80 mmHg is chosen as target, then treatment should start if over 130/80 mmHg.
- Measure weight and calculate BMI at every visit.
- Take A1c measurements every three to six months; every six months if stable on unchanging treatment.
- Arrange fasting lipid panel annually if available.
- Conduct foot exam for amputation risk annually, or every visit if high-risk.
- Conduct annual urine protein dipstick (microalbuminuria dipstick if available to calculate albumin to creatinine ratio) and serum creatinine measurement (GFR calculation) for CKD screening. CKD is defined by $GFR < 60$ ml/min/1.73 m² OR the presence of moderate or severe albuminuria (albumin-creatinine ratio ≥ 30 mg/mmol).
- Conduct dilated pupils retinal exam every two years if treatment available.

Treatment adherence

- Explain the diagnosis of diabetes.
- Inform patient of the complications of untreated diabetes.
- Discuss the possible symptoms of diabetes.
- Show the patient the appropriate dose.
- Prescribe once-daily medications, less expensive generics, and longer-lasting supplies of medicine whenever possible.
- Explain potential adverse effects of the medications and what to do if the patient experiences them.
- Explain how many times a day the patient should take the medication and at what time, and adopt the following simple steps to help them adhere to the guidelines:
 - Label and package the tablets.
 - Check the patient's understanding before the patient leaves the health centre.
- Explain to patient how important it is to:
 - Keep an adequate supply of medications safely at home.
 - Take the medicines regularly as advised, even if there are no symptoms.
- Provide tools such as pill boxes and medication logs to help patients remember to take their medications.
- Assess adherence and discuss barriers at every visit.
- Reconcile clinician's medication list with patient's list, adjust dose, and eliminate unneeded medications.

DIABETES PROTOCOL

Type 2 diabetes management protocol derived from WHO-PEN (27, 29)



SCREENING FOR CHRONIC COMPLICATIONS

- Measure blood pressure at every scheduled visit, review medication as per hypertension protocol
- REFER for dilated-pupil retinal exam upon diagnosis, and every two years thereafter, or as per ophthalmologist recommendation
- Examine feet for ulcers at every visit. REFER to higher level of care if ulcer present
- Assess risk of lower limb amputation annually (foot pulses, sensory neuropathy by monofilament, presence of healed or open ulcers, calluses). REFER to higher level of care if ulcer present or pulse absent
- Test for proteinuria annually. REFER to higher level of care if positive.

MANAGEMENT OF ACUTE COMPLICATIONS

Severe hypoglycaemia (plasma glucose <50 mg/dl or 2.8 mmol/l) or signs:

- If conscious, give a sugar-sweetened drink
- If unconscious, give 20–50 ml of 50% glucose (dextrose) IV over 1–3 minutes.

Severe hyperglycaemia (plasma glucose >18 mmol/l (325 mg/dl) and urine ketone 2+) or signs and symptoms of severe hyperglycaemia:

- Set up intravenous drip 0.9% NaCl 1 litre in 2 hours; continue at 1 litre every 4 hours, REFER to hospital.

Goal for glycaemic control	Plasma glucose**
Fasting	≤7.0 mmol/l (126mg/dl)†

refer to table on diagnostic values for other tests which can be used to diagnose diabetes.

* If they are more affordable than insulin, DPP4-inhibitors, SGLT2-inhibitors or pioglitazone can be used before insulin in cases of treatment failure with metformin and gliclazide. Introduce and titrate insulin treatment according to local practices.

** HbA1c should be used where available.

† Consider less stringent glycaemic control in patients with frequent severe hypoglycaemia, advanced complications, serious comorbidities and/or limited life expectancy.

3 Identifying emergencies and need for referral

A primary care visit may also be for an emergency condition, or evolve to an emergency, and the provider can be equipped to identify and refer such patients to the nearest facility with the required capacity.

Morbidity from acute exacerbations of cardiovascular disease (including but not limited to hypertensive crisis, heart attack, stroke, and diabetic ketoacidosis) can be very time-dependent. Early recognition, resuscitation and referral of patients with acute cardiovascular emergencies is essential.

All providers delivering primary care for cardiovascular conditions should:

1. Know the nearest appropriate higher-level facilities for referral of acute cardiovascular emergencies.
2. Understand how to approach the person with acute difficulty in breathing, shock, or altered mental status (such as that taught in the WHO Basic Emergency Care course).
3. Screen each patient for danger signs that would suggest the need for immediate referral. (This screening may take 2–3 minutes in patients without acute symptoms. A simple list of danger signs is provided below, but facilities may want to use existing referral protocols).

Urgent referral criteria

- New chest pain, chest pain at time of assessment or change in severity or frequency of chest pain
- Symptoms/signs of transient ischemic attack (TIA) or stroke
- Symptoms/signs of heart failure (shortness of breath, difficulty breathing, leg swelling) or heaving cardiac apex
- Severe leg pain with symptoms of claudication
- Blood pressure >180/110 mmHg with severe headache, chest pain, shortness of breath, blurred vision, mental status changes, reduced urine output, nausea, vomiting, lethargy, seizures, papilloedema, focal neurologic signs or signs of heart failure
- Blood pressure >200/>120 mmHg
- Plasma glucose >18mmol/l (325mg/dl) and urine ketones 2+ or signs and symptoms
- Hypoglycaemia unresolved by intravenous glucose
- Suspected type 1 diabetes in a newly diagnosed patient
- Any severe infection or infected ulcer
- Recent deterioration of vision
- Anuria
- Symptomatic tachycardia.

Other referral criteria (non-emergency)

- Known prior heart disease, stroke, TIA, diabetes, kidney disease (if the patient has not had an initial assessment)
- Cardiac murmurs
- Irregular pulse

- Aged under 40 years with BP \geq 140/90 mmHg (to exclude secondary causes of hypertension)
- Persistent blood pressure \geq 140/90 (in diabetes \geq 130/80 mmHg) while on treatment with two or three anti-hypertensives
- Newly diagnosed diabetes with urine ketones 2+ or in lean persons of <30 years
- Diabetes with poor control despite maximal metformin dosing with or without sulphonylurea
- Diabetes with recent deterioration of vision or no eye examination in past two years
- Pregnant women with diabetes or hypertension
- Total cholesterol > 8 mmol/l (310 mg/dl)
- Any protein in the urine (proteinuria), or elevated creatinine
- Symptoms/signs of kidney problems
- Signs of peripheral vascular disease.

Annex: Example of essential CVD medications

Medicine class	Medicine	Usual starting dose (daily)	Usual intensification dose (daily)	Practice points
ACE-I (angiotensin-converting enzyme inhibitors)	lisinopril	20 mg	40 mg	<p>If possible, check serum creatinine and potassium before starting an ACE Inhibitor</p> <p>Contraindications:</p> <ul style="list-style-type: none"> pregnancy advanced CKD aortic stenosis <p>Common adverse effects:</p> <ul style="list-style-type: none"> cough angioedema
	alternative: ramipril	5 mg	10 mg	
	alternative: perindopril	4–5 mg	8–10 mg	
	alternative: enalapril	20 mg	40 mg	
ARB (angiotensin receptor blockers)	losartan	50 mg	100 mg	<p>ARBs cause cough less frequently than ACE inhibitors. Therefore, they are often substituted for ACE inhibitors when patients complain of cough with ACE inhibitors.</p> <p>Contraindications:</p> <ul style="list-style-type: none"> pregnancy
	alternative: telmisartan	40 mg	80 mg	
Dihydropyridine calcium channel blockers (DHP CCBs)	amlodipine	5 mg	10 mg	<p>May be more appropriate in certain ethnic groups, such as African origin</p> <p>Common adverse effects:</p> <ul style="list-style-type: none"> ankle swelling
Thiazide/thiazide-like diuretics	chlorthalidone	12.5 mg	25 mg	<p>Common adverse effects:</p> <ul style="list-style-type: none"> frequent urination electrolyte imbalance
	alternative: indapamide SR	1.5 mg	1.5 mg (no increase)	
	hydrochlorothiazide (HCTZ)	25 mg	50 mg	

Medicine class	Medicine	Usual starting dose (daily)	Usual intensification dose (daily)	Practice points
Beta blockers	bisoprolol	2.5 mg	20 mg (increase 2.5 mg every 2–4 weeks)	Contraindications: <ul style="list-style-type: none"> • acute asthma • heart rate <55 beats/min
	alternative: atenolol	50 mg	100–200 mg after 1 week as needed	
	alternative: metoprolol	25–50 mg	100 mg	
	alternative: carvedilol	Start at 3.125–6.25 mg twice daily	50 mg	
Biguanides	metformin	500 mg with a meal	2000 mg in divided doses	Low risk of hypoglycaemia, but monitor especially in elderly patients Caution in renal impairment Contraindications: <ul style="list-style-type: none"> • renal failure • liver disease Common adverse effects: <ul style="list-style-type: none"> • nausea • diarrhoea
Sulphonylurea	gliclazide	40–80 mg with breakfast	320 mg Above 160 mg/day, take twice daily in divided doses	Gliclazide has a lower risk of hypoglycaemia compared to glibenclamide. Avoid glibenclamide if ≥ 60 years. Common adverse effects: <ul style="list-style-type: none"> • hypoglycaemia, especially in elderly people • weight gain
	glibenclamide	2.5 mg	5 mg twice daily before meals	
Lipid-lowering therapy	simvastatin	20 mg at night	40 mg at night	Common adverse effects: <ul style="list-style-type: none"> • muscle pain or myalgia • the maximum recommended dose for simvastatin when taken with amlodipine and diltiazem is 20 mg day
	alternative: atorvastatin	40 mg	80 mg	
Antiplatelet therapy	aspirin	75–100 mg	–	Avoid in individuals with history of major bleeding

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