NATIONAL GUIDELINE FOR THE PREVENTION AND MANAGEMENT OF HYPERTENSION IN NIGERIA

2023

National Guideline for the Prevention and Management of Hypertension in Nigeria, 2023

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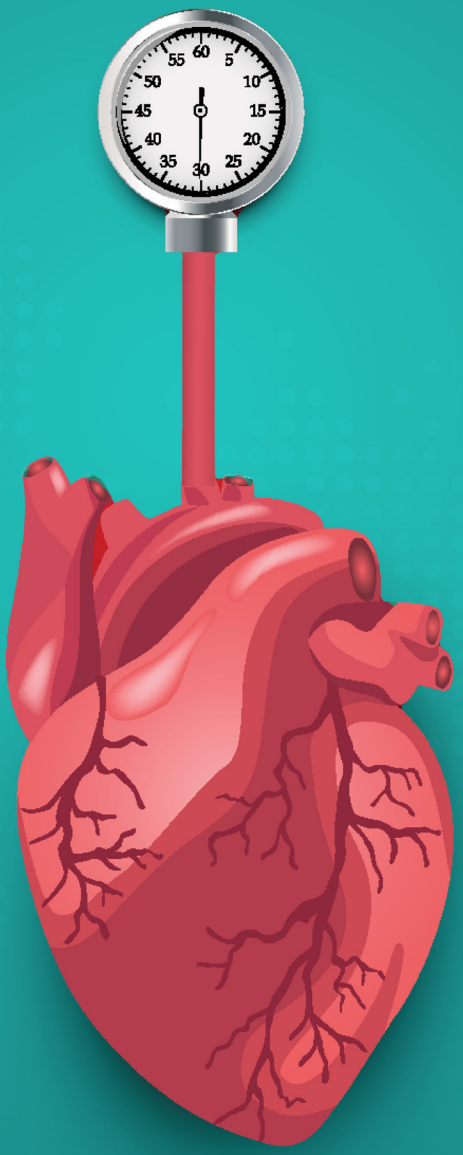

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FOREWORD

Hypertension is the number-one cause of mortality and morbidity. Cardiovascular diseases (CVDs), including heart attacks and strokes, are the most common cause of mortality and morbidity worldwide and are responsible for one-tenth of all deaths in Nigeria. Hypertension prevention and management occur at all levels of health care in Nigeria, including the public and private sectors. Hypertension is diagnosed when a person's systolic blood pressure (SBP) in the office or clinic is ≥140 mmHg and their diastolic blood pressure (DBP) is ≥90 mmHg following a repeated examination on two different days.

According to the World Health Organization (WHO), about 1.13 billion people have hypertension globally. A WHO report also shows that about two-thirds of these individuals live in low- and middleincome countries, and unfortunately, fewer than one in five persons have controlled hypertension. In Nigeria, the only national survey on NCDs conducted in 1991 estimated the prevalence of hypertension to be 11.2%. However, the WHO's 2018 NCD country profile estimated that mortality from cardiovascular diseases is 11%, while the prevalence of raised blood pressure among adults aged 18 and above is 18%.

There have been several studies on the prevalence of NCDs, including hypertension, in the country. A recent systematic review of the major NCDs and risk factors in Nigeria reported a prevalence of 27.6% for hypertensive heart diseases. In comparison, another recent study carried out in one state in each of the six geopolitical zones in the country reported a prevalence of 38.1%.

A systematic review and meta-analysis of hypertension prevalence studies conducted in Nigeria showed that the overall hypertension prevalence is 28.9%, with urban and rural prevalence being 30.6% and 26.4%, respectively. It was estimated that in 2010, there were about 20 million cases of hypertension in Nigeria in adults >20 years, and this is projected to increase to 39.1 million cases by 2030 within the same age group. Sadly, the overall awareness rate of raised blood pressure among hypertension cases is low, estimated at 17.4%.

To ensure coordinated efforts towards tackling the hypertension epidemic, the Federal Ministry of Health and Social Welfare (FMOHSW), in collaboration with stakeholders, developed the Guidelines for the Prevention and Management of Hypertension in Nigeria. This document was to inform evidence-based interventions to assist practitioners and patients in making decisions about appropriate health care for specific circumstances concerning hypertension prevention and management in Nigeria.

Furthermore, developing these guidelines shows the Nigerian government's continuous efforts and commitment to reducing the burden of hypertension in Nigeria. It offers recommendations to clinicians and non-physician health workers alike on different aspects of hypertension care, and it is for use across all healthcare facilities nationwide. These national guidelines will provide uniformity of care for caregivers and ensure long-term blood pressure control in hypertensive patients.

I therefore recommend this document as the national guidelines to be used by all healthcare practitioners and facilities in Nigeria and strictly adhered to in the prevention, control, and management of hypertension in Nigeria.

Professor Muhammad Ali Pate, CON
Honourable Coordinating Minister,
Federal Ministry of Health and Social Welfare,
Abuja, Nigeria.

PREFACE

Globally, hypertension is a leading cause of premature deaths. It is commonly referred to as a “silent killer” because most people with this condition are unaware that they have it, as they may not have prominent warning signs or symptoms before complications set in. According to WHO data, over 1.4 billion people globally have hypertension, translating to about one in three adults living with hypertension. Of these numbers, about two-thirds live in low-and middle-income countries, including Nigeria.

Uncontrolled blood pressure is one of the main risk factors for cardiovascular disease (CVD) and is estimated to be responsible for more than 10 million deaths per year, more than all infectious diseases combined. Unfortunately, only about one in five people with hypertension have their blood pressure controlled. Improving blood pressure control will save lives by preventing fatal heart attacks and strokes and improve productivity by reducing the number of people who are disabled by CVDs and are unable to work.

To stem this tide, the Federal Ministry of Health and Social Welfare, in collaboration with the National Primary Healthcare Development Agency, World Health Organization, and the Resolve to Save Lives, is implementing the National Hypertension Control Initiative (NHCI) Project in Primary Healthcare Facilities in Nigeria. Within the NHCI Project, the hypertension treatment protocol was developed as a quick win for implementation in the PHC facilities.

The Guidelines for the Prevention and Management of Hypertension were therefore developed to provide a more detailed evidence-based approach for the prevention and management of hypertension across all the healthcare facilities in Nigeria. In addition, these national guidelines will enable sustainable blood pressure control, including methods for diagnosing and effectively treating hypertension and care for hypertensive patients.

We hope and desire that this document will guide health providers in preventing, controlling, and managing hypertension in all our healthcare facilities across the country.

Dr Chukwuma Anyaike
Head/Director Public Health Department

ACKNOWLEDGMENTS

The Non-Communicable Disease (NCD) Division appreciates all stakeholders in the local, state, and federal governments as well as partners, civil society networks, professional associations, and privatesector organisations whose enormous contribution and participation have provided abundant insight to the development of this maiden edition of the National Guidelines for the Prevention and Management of Hypertension in Nigeria.

I wish to sincerely acknowledge the visionary leadership of the Top Management Committee (TMC) of the Federal Ministry of Health and Social Welfare (FMOHSW) led by the Honourable Coordinating Minister, Prof Muhammad Ali Pate, CON. I also wish to sincerely appreciate Permanent Secretary for Health, Kachollom S. Daju, mni, and Director of Public Health, Dr Chukwuma Anyaike for their guidance and leadership. Our gratitude equally goes to the directors and programme managers within the FMOHSW and other line ministries, as well as civil society organisations (CSOs) for their commitment and dedication to ensure these guidelines are actualised.

In a special way, I want to recognise and commend the efforts of WHO, the Nigeria Heart Foundation, Resolve to Save Lives (RSTL), and all other stakeholders in Nigeria for sharing their wealth of experience and contributing to the development of this very important document. The technical and financial support by RSTL in the development of this document is worthy of mention, not forgetting the immense technical contribution of the National Hypertension Steering Committee comprising representatives of all stakeholders, including but not limited to members of the state cardiovascular health (CVH) branches, FMOHSW, National Primary Health Care Development Agency (NPHCDA) and other line ministries, civil society, and the Association of Public Health Physicians of Nigeria (APHPN). I sincerely appreciate the efforts of the Expert Committee team led by Prof Augustine Orji for coordinating and harmonising all the efforts that went into this National guidelines' development.

My commendations go to the Hon. Commissioners of Health and the NCD State Coordinators of the 36 states and FCT, especially those from Kano and Ogun States, for providing the state-level reports and all their useful inputs into these national guidelines.

I also want to acknowledge the resilience, commitment and dedication, of our staff, especially from the cardiovascular disease (CVD) branch of the NCD Division.

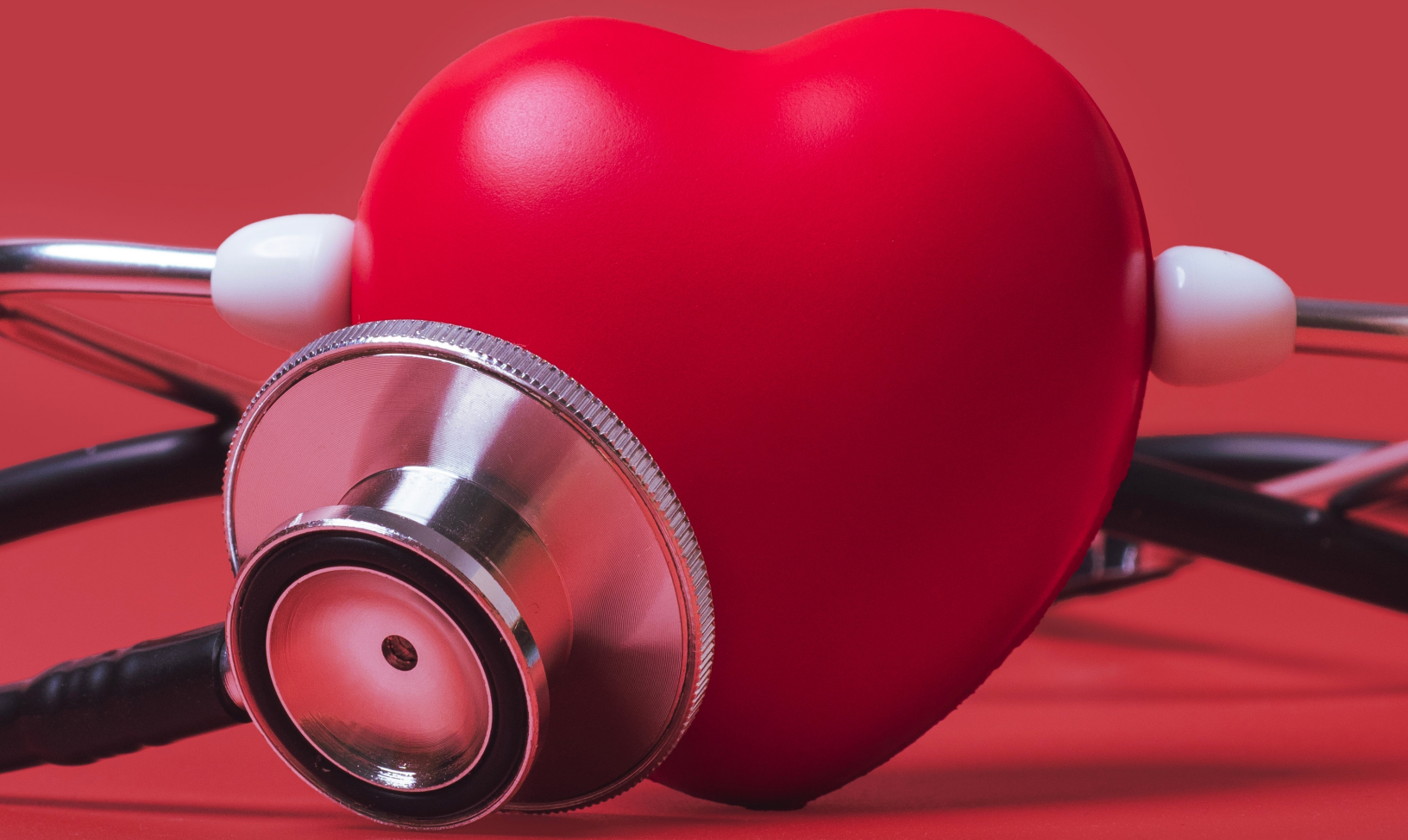
Finally, my ultimate gratitude goes to Almighty God for giving us life and for his plan of well-being and a good life for all his children.

Dr Deborah Bako Odoh
National Coordinator – Non-Communicable Diseases
Federal Ministry of Health and Social Welfare

ACRONYMS AND ABBREVIATIONS

ACEI	Angiotensin Converting Enzyme Inhibitor
ADR	Adverse Drug Reaction
ARB	Angiotensin Receptor Blocker
BP	Blood Pressure
CCB	Calcium Channel Blocker
CHEW	Community Health Extension Worker
CLHW	Community Lay Health Worker
DBP	Diastolic Blood Pressure
ECG	Electrocardiogram
FMOHSW	Federal Ministry of Health and Social Welfare
HIV	Human Immunodeficiency Virus
HMOD	Hypertension-Mediated Organ Damage
JCHEW	Junior Community Health Extension Worker
MUCH	Masked Uncontrolled Hypertension
NCD	Non-Communicable Diseases
NHS	Nigerian Hypertension Society
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
PHCDA	Primary Health Care Development Agency
PICO	Population, Intervention, Comparison, and Outcome
REMAH	REmoving the MASk on Hypertension
SBP	Systolic Blood Pressure
SMOH	State Ministry of Health
STEPs	STEPwise Approach to Surveillance
WHO	World Health Organization

CHAPTER 1:
INTRODUCTION, OBJECTIVES, AND SCOPE



1.1. Introduction

Over the past decade, hypertension has been ranked consistently as a leading risk factor contributing to the global disease burden.[1–4] In 2019, it was responsible for about 10.8 million deaths globally.[4] In Nigeria, it is the commonest non-communicable disease and has posed a major public health challenge in recent times. Prevention and management of hypertension take place at all levels of health care in Nigeria, including the public and private sectors.

To ensure coordinated efforts towards tackling the hypertension epidemic, guidelines containing the minimum standard of care are necessary to equip healthcare professionals and patients with all aspects of hypertension care. Guidelines in healthcare practice[5] are defined as systematically developed statements to assist practitioners and patients in making decisions about appropriate health care for specific circumstances. They help decision-makers make better decisions with a view to proffering better solutions to achieve the best outcomes possible, whether individually or collectively. It is essential that both development and implementation strategies are clearly focused on the “end user”.

Previous hypertension guidelines in Nigeria have been issued by the Nigerian Hypertension Society, first in 1996, revised in 2005,[6] and more recently in 2020.[7] These guidelines were developed by clinicians with minimal input from non-physician health workers and other relevant stakeholders. With the growing interest in deploying task-sharing and task-shifting policies in hypertension management in Nigeria, there is a need to develop guidelines that will garner input from a wide range of end users. Furthermore, for effective monitoring of hypertension management and control in the country, the current guidelines incorporated implementation strategies and data collection tools which had not featured in previous ones.

1.2. Objective and Scope of the Guidelines

The Guidelines for the Prevention and Management of Hypertension in Nigeria aim to provide the most current and relevant evidence-based guidance adapted from the previous Nigerian Hypertension Society Guidelines,[6,7] the WHO Guideline for the Pharmacological Treatment of Hypertension in Adults,[8] the International Society of Hypertension Global Practice Guideline,[9] and the WHO HEARTS technical package. These guidelines offer recommendations to clinicians and non-physician health workers alike on different aspects of hypertension and are for use across all levels of healthcare delivery in Nigeria. They also incorporate relevant elements of the WHO HEARTS[10] technical package of cardiovascular disease management in primary health care.

1.3. Method for Developing the Guidelines

A Core Team of Guideline Development Committee met to determine the scope and PICO (population, intervention, comparison, and outcome) questions for the guidelines. Attention was paid to priority areas in the Nigerian context, including pregnancy and HIV. The core team also identified other areas of controversy in previous guidelines to guide an appropriate review that will inform evidence-based recommendations. Following this and a preliminary scoping review and discussion between the core team and methodology, PICO questions were developed. Concerted efforts were made to include local data wherever it is available.

The development of the national hypertension guidelines was an output of a highly participatory and consultative process involving a wide cross-section of stakeholders, including policymakers, federal and state government officials, technical experts from the academia and other sectors, representatives of the National Non-Communicable Disease (NCD) Technical Working Group, representatives of civil society, and other interest groups), as well as bilateral and multilateral development partners. Among others, the process included a review of the trends of hypertension in Nigeria, previous national response efforts and their results, the existing hypertension policies, and current developments in the global hypertension landscape.

CHAPTER 2:
EPIDEMIOLOGY, DEFINITION, AND CLASSIFICATION OF HYPERTENSION

2.1. Epidemiology

The first report on the national prevalence of hypertension was based on the 1990 Non-Communicable Disease (NCD) Survey[11] organised by the Federal Ministry of Health and Social Welfare (FMOHSW). The survey, which evaluated NCDs including diabetes, hypertension, and sickle cell anaemia, included 16,019 participants drawn from selected local government areas in 13 states of the federation. Hypertension was defined as a systolic blood pressure (SBP) of 160 mmHg and above, and/or a diastolic pressure (DBP) equal to or greater than 95 mmHg or a blood pressure below this figure in individuals who were on treatment. Overall crude prevalence was 11.2%, 11.1% in men and 11.2% in women. Hypertension was more prevalent in urban than in rural communities, with crude rates of 14.7% and 9.8%, respectively. In that report, the country was divided into three geographic zones, viz semi-desert, savannah, and forest zones. The crude hypertension prevalence in these populations was semi-desert 11.5%, savannah 6.8%, and forest 14.6% for men and semi-desert 12.3%, savannah 6.1%, and forest 11.6% for women.

Years after the 1990 survey, smaller regional surveys were conducted in different parts of the country and have been summarised in the past decade in different meta-analyses/systematic reviews,[12–14] thus updating this earlier nationwide survey. In 2002, the World Health Organization introduced the STEPwise approach to surveillance (STEPS) having recognised a global need for risk-factor data on key NCDs, of which hypertension is the major component, and encouraged member nations to conduct nationwide surveys using this methodology. A nationwide survey using the WHO STEPs survey was part of the REmoving the MAsk on Hypertension (REMAH) study,[15] which was conducted in 2017. REMAH included 4,192 participants drawn from the six states of the federation (each state representing each of the six geopolitical zones of the country). The diagnostic threshold of hypertension was 140/90 mmHg.

The overall age-standardised prevalence of hypertension was 38.1%: 39.2% in urban and 37.5% in rural areas. In terms of the geopolitical regions, the South-East region had the highest prevalence rate of 52.8%, while the North-Central region had the lowest rate of 20.9%. According to the report, about 62% of hypertensive Nigerians were aware of their status, and 33% of them were receiving treatment, out of whom only about 13% had controlled blood pressure.

2.2. Definition

Hypertension should be diagnosed when a person's systolic blood pressure (SBP) in the office or clinic is ≥140 mmHg and/or their diastolic blood pressure (DBP) is ≥90 mmHg following repeated examination on two different days.

2.3. Classification of Hypertension

A. Based on level of office BP

Category	SBP (mmHg)	DBP (mmHg)
Optimal	<120	<80
Normal	<130	<85
High normal	130–139	80–89
Grade 1	140–159	90–99
Grade 2	160–179	100–109
Grade 3	≥180	≥110
Isolated Systolic Hypertension	≥140	<90

B. According to office, ambulatory, and home blood pressure levels

Category	SBP (mmHg)		DBP (mmHg)
Office/clinic	**≥140**	**and/or**	**≥90**
Ambulatory			
- Night-time mean	≥120	and/or	≥70
- 24-hour mean	≥130	and/or	≥80
- Daytime mean	≥135	and/or	≥85
Home BP mean	**≥135**	**and/or**	**≥85**

BP = Blood Pressure; **DBP** = Diastolic Blood Pressure; **SBP** = Systolic Blood Pressure
⁎Refers to conventional office BP rather than unattended office BP

CHAPTER 3:

MEASUREMENT OF BLOOD PRESSURE

3.1. Clinic/Office Measurement

Blood pressure should be measured in the clinic using either the auscultatory or the semi-automated oscillometric method. It is important to ensure that the devices used are validated according to standardised protocols.16 The validation status of instruments can be checked on this website: www.stridebp.org.

3.1.1. Optimal Conditions Necessary for Accurate BP Measurement

- The subject should rest for at least 5 minutes before measurement of blood pressure. The rest period should be used by the health worker for greetings, exchange of pleasantries, and discussion of events that may likely be of pleasurable interest to the subject other than the subject of hypertension.
- The subject should not have smoked a cigarette or ingested caffeine in the preceding 30 minutes before the measurement.
- The urinary bladder should be emptied.
- The subject should be seated on a comfortable chair with a back rest, with feet on the floor and the arm supported at heart level, and should desist from talking.
- At the first encounter, BP should be measured in both arms, and the arm with the highest measurement should be used for subsequent measurements.
- The circumference of the arm should be noted, and an appropriately sized cuff chosen accordingly.

The bladder should cover at least two-thirds of the circumference of the arm (see table below for the cuff sizes).

Mid-arm Circumference (cm)	**Bladder size** (width x length in cm)
<22	**9×8**
22–26	**12×22**
27–34	**16×30**
35–44	**16×36**
>44	**16×42**

3.1.2. Auscultatory Approach

- The cuff is inflated until the observer cannot palpate the radial pulse, and the level of BP is noted.
- The cuff is then inflated rapidly 20 mmHg above the level at which the radial pulse was occluded.
- The stethoscope is placed at the cubital fossa and the cuff is slowly deflated at the rate of 2 mm/sec. The first appearance of repeated sounds (Phase I Korotkoff sound), and the disappearances of the sounds (Phase V Korotkoff sound) are regarded as the systolic and diastolic blood pressure, respectively.
- In hyperdynamic states such as pregnancy, aortic regurgitation, and thyrotoxicosis, the sounds may not disappear, and the point of muffling (Phase IV) and Phase V should be documented.

The auscultatory method is the most common blood pressure measurement technique deployed for research and clinical purposes in Nigeria. However, it may be prone to errors such as zero end digit preference, number preference, and misinterpretation of Korotkoff sounds. These errors are minimised by training and re-training of observers both in clinical settings and for research purposes.[17–19]

3.2. Out-of-Office Blood Pressure Measurement

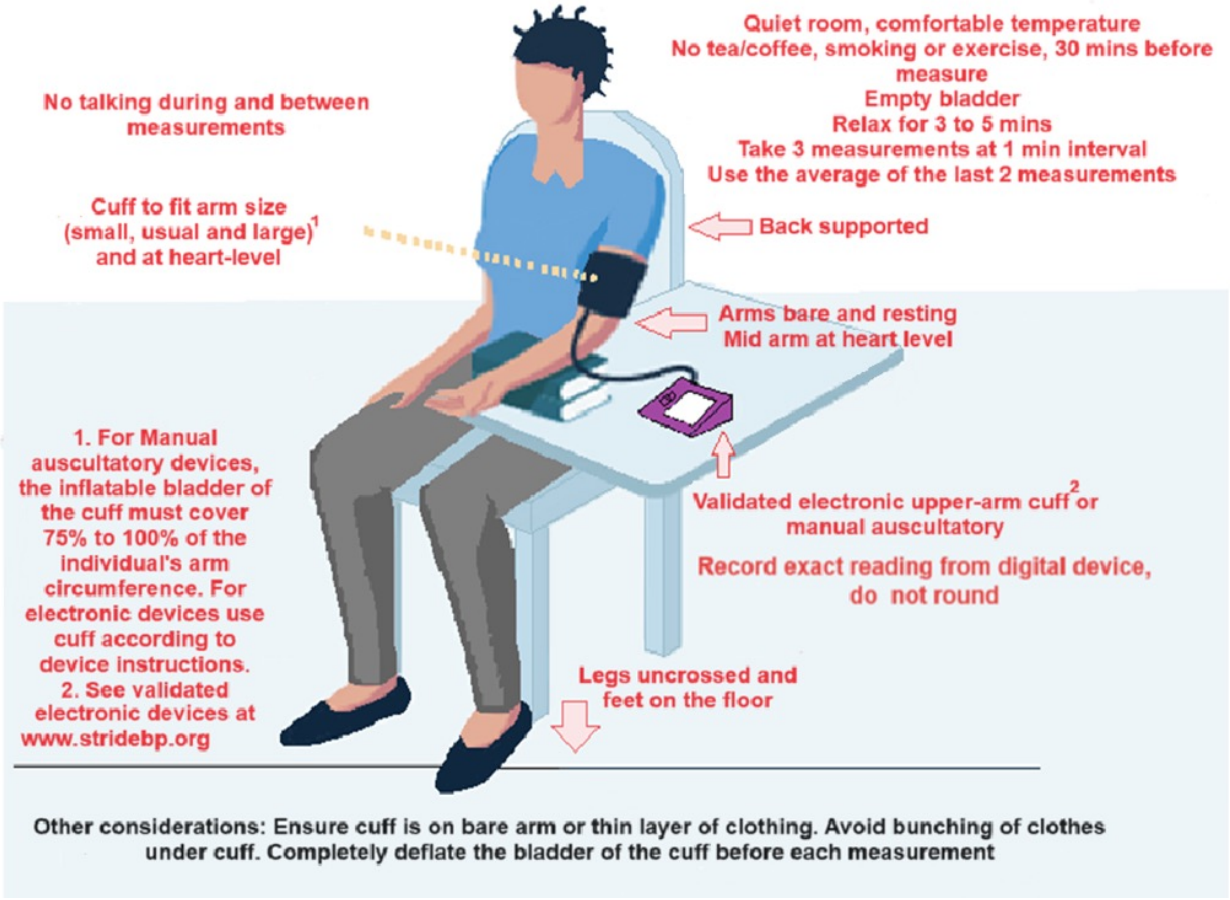
This includes the use of home blood pressure monitoring (HBPM) or ambulatory blood pressure monitoring (ABPM). ABPM should be done over a 24-hour period. Both ABPM and HBPM give more readings than office (clinic) measurement, are more reproducible, and have been found to be more predictive of cardiovascular morbidity and mortality,20 including hypertension-mediated organ damage, than office BP readings. Patient self-monitoring of BP has been found to increase adherence and improve control of hypertension.[21,22]

Indications for out-of-office blood pressure monitoring:

- Suspicion of White-Coat Hypertension
  - Marked office BP elevation without any hypertension-mediated organ damage
  - Grade 1 hypertension on office BP measurement
- Suspicion of Masked Hypertension
  - High normal office blood pressure
  - Normal office BP in individuals with hypertension-mediated organ damage or high total cardiovascular risk
- Evaluation of resistant hypertension
- Evaluation of BP control
- High variability of office measurement
- Evaluating suspected symptoms of postural hypotension in treated patients

How to measure blood pressure.

Adapted from Unger et al.



3.3. Diagnosis of Hypertension

Hypertension is diagnosed if, when blood pressure is measured in the office or clinic on two different days at least 2 weeks apart, the SBP readings on both days are ≥140 mmHg and/or the DBP readings on both days are ≥90 mmHg. The diagnosis might be made on a single visit if BP is ≥180/110 mmHg and there is evidence of Hypertension Mediated Organ Damage (HMOD).

CHAPTER 4:

CLINICAL EVALUATION

4.1. Aims of Clinical Evaluation

The aims of clinical evaluation of hypertension are as follows:

1. Establish the diagnosis and grade of hypertension
2. Identify possible secondary causes
3. Screen for lifestyle factors that may be exacerbating the condition
4. Screen for additional cardiovascular risk factors
5. Identify any hypertension-mediated organ damage

Clinical evaluation will follow the traditional pattern of history, physical examination, and laboratory investigations.

Medical history: Important aspects of medical history include:

- Time the patient was first diagnosed as hypertensive, including record of past and current BP readings
- Past antihypertensive medications
- Family history of hypertension, stroke, and renal disease
- Evaluation of lifestyle, including physical exercise, cigarette smoking, use of alcohol and recreational drugs
- For women, history of past pregnancies, use of contraceptive pills, and menopause
- Medication history, with particular reference to medicines that may increase blood pressure

Physical examination: Key steps in physical examination:

- Weight and height are measured without the shoes and headgear using a calibrated weighing scale; BMI is calculated as weight/height^2.
- Waist circumference is measured with a non-expansible tape without clothing or with light clothing, in between the lower costal margin and the iliac crest with the arm relaxed by the side.
- Radial arteries are palpated to ascertain thickening of the vessels as well as palpation of other peripheral arteries.
- BP is measured in both arms (at least at the first evaluation of patient)
- Examination of the precordium: Examine for displaced apex and auscultation of the heart for added sounds.
- Fundoscopy.
- Examination targeted at identifying secondary hypertension:
    - Palpate for kidney enlargement in suspected polycystic kidney disease.
    - Auscultation for renal bruits in renovascular hypertension.
    - Cushingoid facies (Cushing syndrome) coarse facies (acromegaly).

Red flags for secondary hypertension:

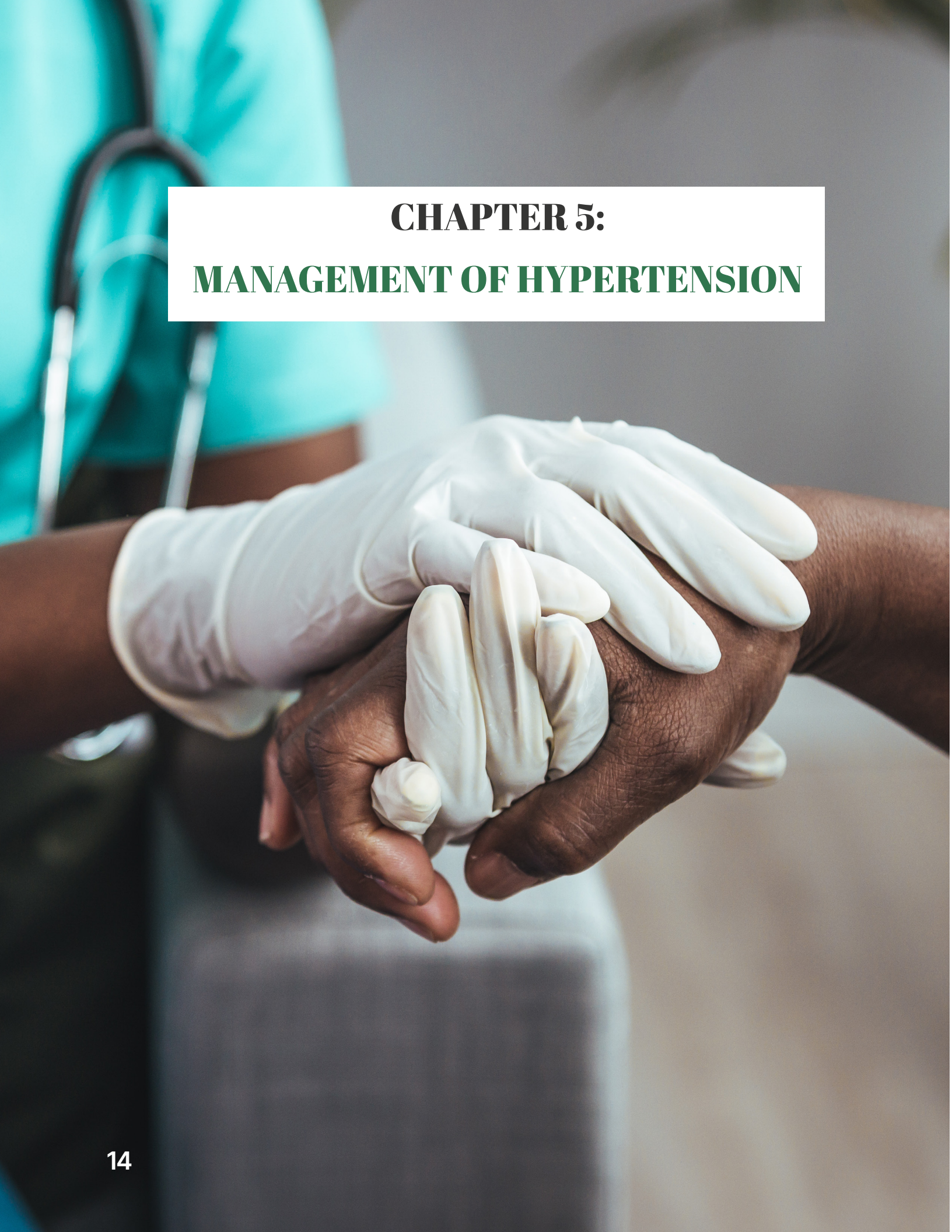
- Age of onset <30 years
- Severe/resistant hypertension
- Acute rise in blood pressure from previously stable reading
- Significant blood pressure variability

4.2. Laboratory Investigations

- Urine analysis: for urine protein, blood, specific gravity
- Serum electrolyte urea and creatinine: estimated glomerular filtration rate (eGFR) using any of the recommended equations, e.g. CKD-EPI equation, MDRD study equation, etc.
- Fasting blood glucose and 2 hours post-prandial in those who have a high risk of diabetes (e.g. first-degree relatives of diabetic patients, obese patients)
- Glycated haemoglobin (HBA1c)
- Packed cell volume (PCV)/haematocrit/haemoglobin
- Serum lipid profile
- Serum uric acid
- 12-lead ECG
- More detailed evaluation is dependent on clinical presentation and the presence of hypertension-mediated organ damage
    - Echocardiography: in suspected cardiac remodelling
    - Carotid ultrasound: in cerebrovascular disease or vascular disease noticed elsewhere
    - Abdominal ultrasound: for determining renal sizes and scarring
    - Ankle-brachial index: in cases of lower extremity arterial disease (LEAD)

4.3. Assessment of Total Cardiovascular Risk

Cardiovascular risk assessment should accompany all clinical decision-making in the management of hypertension. Therapeutic decisions should not be made based on BP alone except in very poor settings where basic laboratory tests for risk assessment cannot be carried out. It is recommended that the WHO Cardiovascular Risk Assessment chart (see Appendix G) should be used whenever possible.



CHAPTER 5:

MANAGEMENT OF HYPERTENSION

5.1. Evidence Supporting Benefit of Treatment

Large bodies of evidence[23–25] derived from meta-analysis of randomised clinical trials across the globe have clearly demonstrated that reduction of blood pressure in patients with hypertension results in clear-cut benefits in terms of cardiovascular (CV) outcomes. This is irrespective of the baseline blood pressure, additional comorbidity or CV risk factors, age, sex, and ethnicity. In terms of effect size, a 10-mmHg reduction in systolic blood pressure (SBP) or a 5-mmHg reduction in diastolic blood pressure (DBP) is associated with significant reductions in all-cause mortality by 10–15%, stroke by 35%, and heart failure by 40%. The benefit of lowering blood pressure especially in stroke reduction has also been demonstrated in individuals whose blood pressure was either high normal or normal but who have high cardiovascular risk.[26]

5.2. General Principles of Management

- Cardiovascular risk assessment is desirable for all patients, as treatment based on predicted risk assessment is marginally more effective than that based on BP levels alone.[27] However, due to the increased costs attributable to risk assessment and the unavailability of a risk prediction equation derived from local data, initiation of therapy especially in low-resource settings is recommended with or without risk assessment.
- Lifestyle modifications and use of antihypertensive medications are recommended for treatment either alone or in combination.
- Lifestyle measures are recommended for all grades of hypertension.
- Initial 1-monthly follow-up is recommended until target blood pressure is achieved and 3- to 6-monthly follow-up afterwards.[28,29] Deployment of telemonitoring of BP may enable longer followup intervals in both cases.[30]
- Non-physician health workers including nurses, pharmacists, and community health workers who have received appropriate training can initiate antihypertensive treatment in primary health care levels where there are no physicians. In such scenarios, remote oversight by a physician using strategies such as mhealth technologies is mandatory. In higher-level health care, non-physician health workers should support the physician through blood pressure measurement, education, and medication delivery in a collaborative care model.
- Self-monitoring of blood pressure by patients is recommended, as evidence shows that this is associated with a substantial reduction in blood pressure.[31] Evidence in support of self-titration of antihypertensive medication is minimal, so it is therefore not recommended.

5.3. Lifestyle Modifications

Healthy lifestyle choices are important for the prevention of hypertension; they reduce blood pressure in individuals who are already hypertensive and potentiate the effect of antihypertensive medications.

Furthermore, they improve general well-being and are helpful in the control of other non-communicable diseases, including cancers. Their usefulness is, however, limited by poor adherence over time and a lack of standardisation. It is recommended that lifestyle modification should be combined with antihypertensive medication and should only be tried alone in those with high normal BP.

5.3.1. Physical Activity

A meta-analysis[32] of the effect of different types of exercise on blood pressure in normotensive, prehypertensive, and hypertensive individuals lays strong evidence for the recommendation of regular physical activity for the prevention and treatment of hypertension.

Table 5.1. Blood pressure lowering effect of different types of exercise.

Exercise type	Systolic BP (mmHg)	Diastolic BP (mmHg)
Endurance dynamic	3.5	2.5
Dynamic resistance	1.8	3.2
Combined	No effect	2.2
Isometric	10.9	6.2

The blood pressure-lowering effect of exercise training is greater in people with hypertension compared to those with prehypertension and normal BP. As regards the intensity and duration of this exercise, regular moderate- to high-intensity exercise lowers mortality when compared to low-intensity exercise in cohort studies.[33]

Recommendations on Physical Activity:
At least 150 minutes of moderate physical activity (a mild increase in heart rate or breathing rate resulting from, for example, brisk walking, climbing stairs, dancing, gardening, or doing household chores) spread throughout the week, or at least 75 minutes of vigorous physical activity (including vigorous gardening, running, fast cycling, fast swimming, or playing sport) spread throughout the week), or an equivalent combination of moderate and vigorous activity; muscle-strengthening activities involving major muscle groups on two or more days a week.

5.3.2. Reduction/Cessation of Alcohol Consumption

Evidence from two small randomised controlled trials[34,35] suggests a strong positive linear relationship between BP and alcohol consumption in both normotensive35 and hypertensive individuals.[34] The Prevention and Treatment of Hypertension Study (PATHS)[36] investigated the effects of alcohol reduction on BP. The intervention group had a modest 1.2/0.7 mmHg lower BP than the control group at the end of the 6-month period. To further investigate the role of alcohol in cardiovascular health, a Mendelian randomisation of 56 epidemiological studies[37] involving 261,991 individuals of European descent concluded that individuals with a genetic variant associated with non-drinking and lower alcohol consumption had a more favourable cardiovascular profile and a reduced risk of coronary heart disease than those without the genetic variant. This study suggests that reduction of alcohol consumption, even for light to moderate drinkers, is beneficial for cardiovascular health.

On the contrary, a number of observational studies[38] reported a J-shaped association between alcohol intake and a variety of cardiovascular diseases including stroke, congestive cardiac failure, dementia, Raynaud's phenomenon, and all-cause mortality. It was opined that the alcohol molecule, not any other

component of alcoholic drinks, exerts a positive effect through an increase in the HDL-C/LDL-C ratio. In line with this evidence, many guidelines[v] have recommended moderation in alcohol intake in hypertensive patients without recourse to the strength of such evidence on which the recommendation is based.

Recommendations on Alcohol Use:
Individuals who do not drink alcohol at all should be encouraged to maintain abstinence. For those who drink, it is recommended that they consider stopping or drink no more than two units of alcohol per day and not drink on at least 2 days of the week. A unit of alcohol is equivalent to 8–10 g of pure alcohol.

5.3.3. Reduction in Salt Consumption

Recommendations on Salt Intake:
Total salt intake should be less than 5 g of salt per day (equivalent to approximately 1 level teaspoon), including salt added while cooking or eating, as well as salt contained in foods such as processed foods and bread.

5.3.4. Other Dietary Advice

Other Dietary Recommendations:

- **Vegetables:** at least 400g (five portions) of vegetables and fruits per day. One portion is equivalent to a single orange, apple, mango, or banana, or 3 tablespoons of cooked vegetables

- **Sugar:** total daily energy intake from free sugars of less than 10% equivalent to 50g (or approximately 12 level teaspoons) for a person of healthy body weight. Free sugars are those added to foods such as cakes, cookies and sweets, or drinks (for example, soda, sweetened milk, fruit juices). Free sugars are also naturally present in honey, syrups, fruit juices, and fruit juice concentrates.

- **Fats and Oils:** total daily energy intake from fats of less than 30%. Unsaturated fats are preferable to saturated fats. Less than 10% of total energy intake should be from saturated fats. Saturated fats are found mainly in animal products such as meat, milk, butter, cream, cheese, ghee, and lard. They can also be found in palm and coconut oil. Many saturated fats are solid, such as the fat in meat. Consuming saturated fats in unhealthy amounts can lead to raised cholesterol levels and can increase the risk of heart attack and stroke. Trans-fats: Industrially produced trans-fats (also called partially hydrogenated vegetable oils) are liquid vegetable oils that have been processed to make them solid at room temperature. Trans-fats are unhealthy and cause heart disease. Trans-fats are often found in processed food, fast food, snacks, fried food, frozen pizza, pies, cookies, margarines, and spreads. Unsaturated fats/oils are generally found in plant foods such as seeds, grains, nuts, vegetables, and fruits (for example, avocado) and also in fish. They can be either polyunsaturated (as in sunflower, soya, corn, and sesame oils) or monounsaturated (for example, olive and rapeseed oils). Consuming unsaturated fats/oils instead of saturated fats helps to control cholesterol levels and reduces the risk of heart attack and stroke.

5.4. Pharmacological Therapy

5.4.1. Choice of Medications

Five classes of antihypertensive medications have been widely used in major clinical trials and have been found to reduce BP and improve cardiovascular outcomes in patients with hypertension. They include diuretics, calcium channel blockers (CCBs), angiotensin receptor blockers (ARBs), angiotensin converting enzyme inhibitors (ACEIs), and beta blockers.

A large body of evidence[40–43] indicates that diuretics and calcium channel blockers are the most efficacious in terms of BP lowering in Black people compared to the other three groups. The main concern about the use of thiazide and thiazide-like diuretics (chlorthalidone, indapamide) is the documented side effects associated with their use, including hypokalaemia and hyperuricaemia, dyslipidaemia, and increased incidence of new-onset diabetes mellitus.[44] The long-term effect of these concerns on cardiovascular outcomes among Africans has not been studied in randomised clinical trials.

A 2004 review of antihypertensive therapy in Black Africans[45] reported that despite the differing efficacy of blood pressure lowering among Blacks, there is no strong evidence that efficacy for reducing morbidity and mortality outcomes varies once patients achieve their BP goal. Calcium channel blockers are thus recommended as first-line monotherapy and should be used with either diuretics or ACEIs/ARBs in combination therapy if the need arises.

Beta blockers, ACEIs, and ARBs are less effective in Blacks and therefore not recommended for monotherapy. Other classes of antihypertensive medications such as alpha-adrenergic blockers, direct vasodilators, and centrally acting agents should be used as second-line, preferably by a hypertension specialist, after ensuring that the first-line medications have been administered in recommended doses.

5.4.2. Key Recommendations on Pharmacological Therapy

Strategy	Recommendations
Threshold for the initiation of pharmacological treatment	• Individuals with a confirmed diagnosis of hypertension and SBP of ≥140 mmHg or DBP ≥90 mmHg • Individuals with existing cardiovascular disease and SBP of 130–139 mmHg • Individuals without cardiovascular disease, but with high cardiovascular risk, DM, or CKD, and SBP of 130–139 mmHg
Goal for therapy	• In all patients without comorbidities, the target BP should be <140/90 mmHg. • For patients with hypertension and known CVD, a target of 130/80 mmHg is recommended. • For high-risk patients with hypertension (patients with high CV risk, DM, CKD), the target is 130/80 mmHg.
Drug administration	• Low doses of choice medicines should be used to initiate therapy, as this is known to minimise side effects. • Two or more medicines from different classes should be used if BP is 20/10 mmHg above the goal (see below). • Long-acting medications rather than short-acting ones provide longer duration of BP lowering effect, thereby reducing BP variability. • Medicine from different classes works synergistically to maximise the antihypertensive effect and also minimise side effects. • Most patients will require two or more medications to achieve control. • Combination of two or more medicines in a single pill formulation against administration of multiple pills encourages adherence and is recommended when appropriate.

Treatment algorithm	• A simple treatment algorithm that applies to all patients is recommended, especially in the context of treatment by non-physician health workers (treatment protocol in Figure 5.1). • For higher levels of care administered by physicians, other treatment algorithms apply. • For monotherapy, a CCB should be used except if there is a contraindication or any compelling indication for the use of other medications (see Tables 5.1 and 5.2). • If the BP is not controlled on CCB therapy, or when initial therapy requires the use of two medicines, the combination of diuretic (a fixeddose combination of thiazide and amiloride) and CCB could be used, or another medicine selected from ACEIs, ARBs, and beta blockers should be added to the CCB. • A third medicine from a class other than the first two should be added as required.
Recommended combinations	• Diuretics and beta blockers should be used with caution because of the risk of new-onset DM. • ARBs and ACEIs should not be administered together because of increased risk of hyperkalaemia.
Time of drug administration	• Night-time therapy is recommended[46] except for those on diuretics who may have distorted sleep from increased urinary frequency at night.
Additional therapy	• Antiplatelet therapy (e.g. low-dose aspirin) is recommended in patients who have had previous vascular events, such as transient ischaemic attack (TIA), ischaemic stroke, ischaemic heart disease, and peripheral arterial disease. Aspirin should not be used in primary prevention in patients with elevated BP with no previous CVD. • Low-dose aspirin should only be used if indicated after the BP has been controlled. • Patients with moderate to high CV risk or those with a previous vascular event including TIA, stroke, and ischaemic heart disease should be treated with statins.

NIGERIA

Hypertension Treatment Protocol for Primary Health Care level

Federal Ministry of Health

Measure blood pressure of **all adults** ≥ 18 years of age.

High blood pressure: SBP ≥ 140 mmHg or DBP ≥ 90 mmHg.

Step 1 If BP ≥140/90 mmHg,*
Start amlodipine 5 mg.

Step 2 After 1 month, measure BP again. If still high,
Treat with amlodipine 5 mg + losartan 50 mg.

Step 3 After 1 month, measure BP again. If still high,
Treat with amlodipine 10 mg + losartan 100 mg.

Step 4 After 1 month, measure BP again. If still high,
Treat with amlodipine 10 mg + losartan 100 mg + HCTZ 25 mg.

Step 5 After 1 month, measure BP again. If still high,
Refer for specialist hypertension management.

*If initial BP ≥ 160/100 mg, but <180/110 mmHg, start at STEP 2.

*If initial BP ≥ 180/110 mg, give step 3 drugs and refer to the emergency unit of the nearest general hospital within 1 hour.

Notes:

- **Single pill combination of amlodipine plus losartan is preferred to free combination.**
- HCTZ= Hydrochlorothiazide.
- Telmisartan 40mg and 80mg if available is preferable to losartan.
- May substitute HCTZ 25mg with amiloride 2.5mg/HCTZ 25mg if HCTZ is unavailable.

Special populations

Pregnant women and women who may become pregnant

DO NOT GIVE losartan to pregnant women nor to women of childbearing age who are not on effective contraception.

If pregnant, refer to obstetric specialist

Stop tobacco use and harmful use of alcohol

Increase regular physical activity to at least 30 minutes daily.

If overweight, lose weight.

Eat a heart-healthy diet low in salt, trans fats and added sugar:

- Eat 5 servings of fruits and vegetables per day.
- Eat nuts, legumes, whole grains and foods rich in potassium.
- Eat fish at least twice per week.
- Use healthy oils like sunflower, flax seed, soybean, peanut and olive.
- Limit red meat to once or twice per week.
- Limit consumption of ultra-processed, canned and 'fast' foods.
- Avoid donuts, cookies, sweets, fizzy drinks and juice with added sugar.

Table 5.1. Compelling indications in special settings
Adapted from NHS Guideline 2020[7]

Clinical condition	Medications
Left ventricular hypertrophy	ACEIs, ARBs, diuretics, β-blockers
Heart failure	ACEIs, ARBs, β-blockers, diuretics, MRA
Ischaemic heart disease	β-blockers, ACEIs, ARBs
Stroke	CCB, diuretics, ACEIs
Nephropathy	ACEIs, ARBs, diuretics
Diabetes mellitus	ACEIs, ARBs, thiazide and thiazide-like diuretic, CCB
Elderly	Diuretics, CCB
Pregnancy	β-methyldopa, CCB (nifedipine), labetalol, hydralazine

Table 5.2. Contraindications for specific antihypertensive medicines
Adapted from NHS Guideline 2020[7]

Medication	Contraindication	Caution
Diuretic	Gout	Pregnancy, glucose intolerance
CCB (nondihydropyridines)	2° and 3° heart block, heart failure	
CCB (dihydropyridines)		Nephropathy with proteinuria, heart failure, tachyarrhythmia
β–blocker	2° and 3° heart block, reactive airway disease, severe bradycardia <50/min, peripheral vascular disease	Glucose intolerance, athletes, pregnancy, autonomic neuropathy
ACEI/ARB	Pregnancy, hyperkalaemia, bilateral renal artery stenosis	Women of childbearing age, GFR (<30 ml/min)
Centrally acting medicines	Active liver disease	Liver disease, erectile dysfunction, elderly, depression

5.4.3. Pharmacovigilance

Pharmacovigilance is the science and activities relating to the detection, assessment, understanding, and prevention of adverse effects or any other medicine-related problem. The ultimate goal of pharmacovigilance is to improve the safe and rational use of medicines, thereby improving patient care and public health. An adverse drug reaction (ADR) is "a response to a drug that is noxious and unintended and occurs at doses normally used in humans for the prophylaxis, diagnosis, and treatment of disease, or for modification of physiological function". Voluntary or spontaneous reporting of ADR is a sure way of improving drug safety, but underreporting is a major challenge in most low- and middle-income countries.[47,48]

Cardiovascular medications such as antihypertensives contribute just about 0.03% to the number of individual case safety reports (ICSRs) received by the National Pharmacovigilance Centre between 2004–2015. However, the situation may have been underreported.[48] Hypertension, being a chronic illness, requires long-term therapy, and as such, there is an increased propensity for adverse drug events.[49] Furthermore, with the increasing shift towards hypertension control as a public health programme, opportunities to track ADRs should be explored.

Unlike ADRs, side effects are often related to the medicine's pharmacological properties and may even be beneficial. Side effects of common antihypertensive medications should be discussed with the patients, as this is known to increase patients' confidence and trust in health workers. Health workers should be trained on the pharmacovigilance system, including the use of the yellow form (see Appendix L for reporting).

Table 5.3. Side effects of common antihypertensive medications

Drug Class	Side effect	Recommendation
CCBs	Ankle swelling, tachycardia	Combination with ACEI or ARB
ACEIs	Dry cough, angioneurotic oedema	Withdraw drug
ARBs	Angioneurotic oedema	Withdraw drug
Beta blockers	Bradycardia, bronchial constriction	Avoid in patients with asthma
Thiazide diuretics	Electrolyte disturbances, increasedurinary frequency, dyslipidaemia and new-onset DM	Combination with a potassiumsparing diuretic; consider morning dosing if nocturia causes insomnia

5.4.4. Follow-Up

Following the initiation of treatment with either lifestyle measures and/or pharmacological therapy, it is recommended that follow-up visit intervals should be shorter, within the range of 1 to 4 weeks. If the clinic BP remains controlled at three consecutive monthly visits, a visit interval of between 3 and 6 months is recommended. Evidence in more developed countries shows that there is no difference between 3-month and 6-month intervals of follow-up visits in controlled patients.[29] Stable patients with controlled BP can receive multi-month dispensing of antihypertensive medications along with visit spacing for their follow-up visits. The following criteria can be used to identify a stable patient:

- Must have been on antihypertensive treatment for at least 6 months.
- Have their BP under control – BP 140/90 mmHg at the last two consecutive visits/measured on two

occasions at least 1 month apart.

- Must be on current medication combination for at least 3 months.
- A good understanding of life-long treatment and adherence.
- Patients must generally be well, without acute illness/co-morbidity requiring intensive follow-up.
- Absence of any adverse drug reaction (ADR) and side effect that requires constant monitoring.

Getting BP controlled is the main objective of follow-up visits. Ensuring adherence and self-monitoring of BP are two very important ways of getting BP to target levels.

5.4.5. Adherence

The most reliable ways of detecting adherence include measurement of drug concentration in urine and directly observed treatment followed by ABPM over subsequent hours. Although the use of questionnaires is very easy to do, it overestimates adherence. Barriers to adherence range from the physician's attitude and the patient's beliefs and behaviour to the complexity of the dosing regimen, medication availability and affordability, and a range of other health system factors. Interventions found to improve adherence include those that link therapy to habits,[50] self-monitoring of BP,[51] motivational interviewing, and use of simplified dosing formulations.

Home BP monitoring is encouraged during the follow-up period, as this has been noted to improve adherence to medication[53] and increase the rate of control of hypertension.[54] It is recommended that patients should be trained on how to use home BP monitors, using validated instruments. To help the health worker assess BP control using home BP monitors, at least 12 measurements comprising duplicate morning and evening recordings over 3 days preceding the clinic visit are recommended.

Morning measurement should be on waking up and evening measurement before bedtime. Where feasible, inclusion of telemonitoring of blood pressure will further reduce the number of clinic visits and may reduce unnecessary treatment of white-coat hypertension.[55]

5.5. Prevention of Hypertension

Prevention of hypertension can be achieved by deploying either a targeted and/or a population-based approach. The targeted approach is primarily used in healthcare settings and seeks to achieve a clinically important reduction in BP for individuals at the upper end of BP. A population-based approach is applied to the entire population and aims to achieve a smaller reduction in BP, thereby resulting in a downward shift in the BP distribution of the entire population. The impact and cost-effectiveness of a population based preventive approach are higher compared to the targeted approach. This assertion is based on the principle that a large number of people exposed to a small increased CVD risk may generate many more cases than a small number of people exposed to a large increased risk.[56]

Population-based approaches include widespread education on hypertension; provision of physical infrastructure that promotes physical activity such as trails for walking and cycling; alcohol and tobacco policy; and food policy that regulates sugar-sweetened beverages, salt content, and food labelling. Such preventive measures need multi-sectoral involvement and strong political will by governments at all levels. Community outreach and screening activities in markets, barbershops, and places of worship enable increased awareness of hypertension and education of the general public on prevention strategies. Lay members of the public, including opinion influencers, can be trained on measurement of BP and basic hypertension preventive measures. These individuals, in turn, will become peer educators, thereby complementing the efforts of health workers in their communities.

CHAPTER 6:
HYPERTENSION IN SPECIAL SETTINGS

6.1. Resistant Hypertension

Hypertension is defined as resistant or refractory to treatment when a therapeutic plan that includes attention to lifestyle measures and the prescription of at least three antihypertensive medications (including a diuretic) at maximal doses has failed to lower office systolic and diastolic BP values to <140 mmHg and/or <90 mmHg, respectively. Before a diagnosis of resistant hypertension is made, it is necessary to exclude the following causes of pseudo-resistant hypertension:

i. Poor adherence to prescribed medications

ii. White-coat phenomenon, in which office BP is elevated, but BP is controlled using out-of-office measurement (ABPM or HBPM)

iii. Office measurement error, e.g. use of an inappropriately sized cuff

iv. Marked brachial artery calcification, especially in the elderly (check for prominent locomotor brachialis)

Common causes of resistant hypertension include:

• Lifestyle factors, e.g. harmful alcohol consumption, excessive salt consumption, rapid weight gain, substance abuse

• Concurrent intake of agents that raise BP, e.g. steroids, NSAIDs, Erythropoietin, cyclosporine

• Obstructive sleep apnoea

• Undetected secondary forms of hypertension

Resistant hypertension occurs in about 5–10% of treated patients with hypertension and up to 20–30% in clinical trials.[57] Patients' characteristics associated with resistant hypertension include older age, female sex, Black race, high baseline blood pressure, obesity, left ventricular hypertrophy, CKD, and DM.[57, 58] The approach to a patient with resistant hypertension includes evaluation and use of spironolactone[59, 60] and selective endothelin receptor antagonist.[61]

6.2. Masked Hypertension (MH)

This is a condition whereby a patient is normotensive in the clinic, but the BP measurement outside the clinic setting using either ABPM or HBPM is in the hypertensive range. This condition is seen even in treated patients, when it is specifically referred to as masked uncontrolled hypertension (MUCH).

Removing the MAsk on Hypertension (REMAH), a nationwide observational study[62] conducted in 2017, reported that the prevalence of masked hypertension in Nigeria was 13% in the general population, 12% among untreated individuals, and 27% among those being treated for hypertension. In another study, the prevalence and determinants of masked hypertension in a Nigerian urban population were comparable to those in an international database including Caucasians, South Americans, and Asians.[63] According to the nationwide REMAH study,[62] the characteristics of individuals with masked hypertension include older age, high normal office BP, and higher random blood glucose. In addition to these characteristics, cigarette smoking and male gender were reported in a similar epidemiological study[64] involving a large cohort of Black Americans. Masked uncontrolled hypertension is very common among patients with DM and CKD.

The prognostic implication of masked hypertension in the general population as well as in different patient

groups was reported in a meta-analysis of 21 prospective observational studies.[65] A total of 130,318 participants were included in the meta-analysis, and the studies used either ambulatory BP monitoring or home BP measurement to assess out-of-office BP. The pooled risk ratio for MH vs normotension was 1.67 and 2.19 for all-cause and cardiovascular mortality, respectively. The pooled risk ratios for fatal and nonfatal cardiovascular, stroke, cardiac, coronary, and renal disease events were 1.71, 1.95, 1.76, 1.62, and 3.85, respectively.

Approach to a Patient with Masked Uncontrolled Hypertension:

Identification of patients with masked hypertension is always difficult, since the clinic blood pressure in such patients is always normal. However, individuals whose office BP is high normal and who have HMOD such as CKD or DM are candidates for further evaluation for masked hypertension using ABPM or HBPM. Up-titration of treatment as well as a night-time dosing regimen should be considered to ensure that both office and out-of-office BP are controlled.

6.3. White-Coat Hypertension (WCH)

This refers to a situation where an individual who is not on treatment for hypertension has elevated office blood pressure in the hypertensive range but normal out-of-office BP measured with ABPM. It occurs in about 15–30% of individuals with elevated office BP.[66,67] Characteristically, WCH occurs more frequently in women, non-smokers, older adults, patients recently diagnosed with hypertension, and patients without hypertension-mediated organ damage. Compared with sustained normotensive people, white-coat hypertension is associated with increased CV risk.[68,69] Treatment of patients with white-coat hypertension is still an object of controversy; while some studies report no benefit,[70] others report a possibility of reduction in CV morbidity and mortality especially in the very elderly.[71] At the moment, no RCT has aimed to address whether white-coat hypertension should be treated or not; clinical decisions in this regard remain empirical.

6.4. Secondary Hypertension

This implies hypertension caused by another medical condition, and it accounts for about 5% of all hypertensive cases. It should be suspected in the following settings:

- Sudden onset of hypertension before age 30 or after 55
- Severely elevated blood pressure
- No family history of hypertension
- Resistant hypertension
- Longstanding history of kidney disease

Approach to Patient:

Treatment should not be delayed while diagnostic workup is ongoing. In many cases, hypertension resolves if the underlying cause is treated.

6.5. Hypertension in Pregnancy

Hypertensive disorders in pregnancy are among the leading causes of poor pregnancy outcomes in sub-Saharan Africa (SSA). A recent systematic review[72] which aimed at defining the overall and type-specific prevalence of hypertensive disorders in pregnancy in SSA included 70 studies, about half of which were conducted in Nigeria. The pooled prevalence of hypertensive disorders of pregnancy (all types combined), chronic hypertension, gestational hypertension, pre-eclampsia, and eclampsia were 8%, 0.9%, 4.1%, 4.1%, and 1.5%, respectively.

Classification:

i. Pre-eclampsia–eclampsia

ii. Chronic hypertension of any cause

iii. Chronic hypertension with superimposed pre-eclampsia

iv. Gestational hypertension

Due to the haemodynamic and vascular changes that occur in pregnancy, instruments for recording office or out-of-office blood pressure must be validated in pregnancy using standardised protocols.[73,74] While using the auscultatory method, the 4th Korotkoff sound, i.e. the point at which the sounds muffle should be used as the DBP.

Approach to a pregnant patient with hypertension:

Validated instruments should be used for measurement of both office and out-of-office blood pressure. BP should be measured either sitting or in the lateral decubitus position. Common medications to be considered include nifedipine, labetalol, alphamethyldopa and hydralazine. Pregnant women with hypertension should be referred to a specialist.

6.6. Hypertension in Diabetes Mellitus

An elevated and distorted pattern of blood pressure is a common feature of both type 1 and 2 DM. The prevalence of hypertension diagnosed using office blood pressure measurement alone in patients with DM is usually higher than in the general population.[75,76] Patients with DM have a blunted fall in nocturnal blood pressure and exhibit higher incidence of masked hypertension compared to those in the general population.[77] Among the treated patients with hypertension, those who have DM are also known to have higher incidence of masked uncontrolled hypertension.[78,79]

The presence of hypertension in type 2 DM (T2DM) accelerates the development and progression of chronic complications. Hypertension has also been found to increase atherosclerotic cardiovascular disease (ASCVD) risk among persons with T2DM. Lowering blood pressure in people with diabetes reduces the risk of mortality and cardiovascular morbidity.[80,81] Cardiac autonomic dysfunction is a common complication in diabetes[82] and as such exposes both treated and untreated patients to postural hypotension. Selective inhibitors of sodium glucose cotransport 2 such as empagliflozin and canagliflozin have been demonstrated in more recent randomised control trials[83,84] to reduce both office and ambulatory blood pressure substantially in addition to their glucose-lowering effect.

Clinical Approach to a Patient with Hypertension and Diabetes Mellitus:

Diagnosis: Measure the blood pressure standing in addition to lying due to the high incidence of postural hypotension. Out-of-office BP recording using ABPM is highly recommended in treated patients, as many may have masked uncontrolled hypertension.

Treatment: The treatment strategy should include an ACEI or an ARB because of its salutary effect on albuminuria. The target BP recommended is 130/80 mmHg. It is recommended that for patients who have blunted nocturnal dipping of blood pressure, a night-time dosing regimen should be added. Sodiumglucose cotransport inhibitor may be considered in situations where the blood pressure is difficult to lower to target.

6.7. Hypertension in Chronic Kidney Disease (CKD)

Hypertension affects up to 80% of patients with CKD,[85] which is defined as the presence of reduced kidney function (an estimated glomerular filtration rate eGFR) <60 mL/min/1.73m^2. On the other hand, hypertension is a major risk factor for the development and progression of CKD. Characteristically, in hypertensive patients with CKD, masked hypertension with blunted dipping of night-time blood pressure and resistant hypertension are common. A meta-analysis published in 2013 reviewed the cardiovascular and renal effects of intensive blood pressure lowering in CKD patients.[86] Intensive blood pressure lowering compared to standard therapy reduced the risk of progression to end-stage renal disease in those with proteinuria, but there was no obvious benefit in cardiovascular events or death. A more recent metaanalysis in 2017 included more studies and reported that more intensive blood pressure lowering caused a reduction in all-cause mortality compared to the standard therapy.[87] Angiotensin system blockade with either ARB or ACEI lowers proteinuria, and these drugs are more reno-protective compared to other antihypertensive classes.[88,89]

Approach to Hypertension in a Patient with CKD:

Out-of-office BP measurement may be considered to rule out masked hypertension and a non-dipping blood pressure pattern. Loop diuretic should be preferred to thiazide diuretics when the GFR is <30 ml/min. Initiation of BP treatment should start with a renin-angiotensin blocker combined with either a calcium channel blocker or diuretics. The target BP should be less than 130/80 mmHg.

6.8. Hypertension in the Elderly

Among Nigerians as in other populations, blood pressure increases with age, and as such, the prevalence of hypertension increases from 6.8% among those less than 30 years to 63% among those 70 years and above.[15] Initial concerns about the benefit of antihypertensive medications in old and very old patients have been addressed by RCTs[90,91] which related antihypertensive medications in such populations to reductions in CV morbidity, CV mortality, and all-cause mortality. The major challenge with the management of hypertension in the elderly is the presence of comorbidities such as atherosclerotic vascular disease or renal and heart failure. Postural hypotension is common, and it may be worsened by antihypertensive medications.

6.9. Hypertension in Children and Adolescents

In the absence of outcome data, hypertension's definition in children and adolescents is based on the normal distribution of blood pressure among healthy children. Blood pressure greater than the 95th percentile value is regarded as hypertensive. An appropriately sized cuff with the bladder covering two-thirds of the arm must be used in children and adolescents.

Table 6.1 Classification of Hypertension in Children and Adolescent.
American Academy of Pediatrics[92]

For Children Aged 1–13 y	For Children Aged ≥13 y
Normal BP: <90th percentile	Normal BP: <120/<80 mmHg
Elevated BP: ≥90th percentile to <95th percentile or 120/80 mmHg to <95th percentile (whichever is lower)	Elevated BP: 120/<80–129/<80 mmHg
Stage 1 HTN: ≥95th percentile to <95th percentile + 12 mmHg or 130/80–139/89 mmHg (whichever is lower)	Stage 1 HTN: 130/80–139/89 mmHg
Stage 2 HTN: ≥95th percentile + 12 mmHg, or ≥140/90 mmHg	Stage 2 HTN: ≥140/90 mmHg

6.10. Hypertension in HIV

The burden of hypertension among people living with HIV is higher compared to individuals who are HIV-negative.[93,94] The pathophysiological pathway that underpins the association of HIV infection and hypertension is not well understood. However, various factors including T-cell activation and release of cytokines, which promotes renal sodium and water retention, vasoconstriction, and vascular remodelling, all act synergistically to cause elevation in blood pressure. Furthermore, a few studies have reported that HIV patients on antiretroviral therapy over months to years as compared to drug-naïve patients have a higher incidence of hypertension.[95,96] Possible drug–drug interaction between antiretroviral drugs and antihypertensive agents poses some therapeutic challenges when the two conditions co-exist. Table 6.2 summarises the interaction between commonly prescribed antihypertensive medications and antiretroviral drugs.

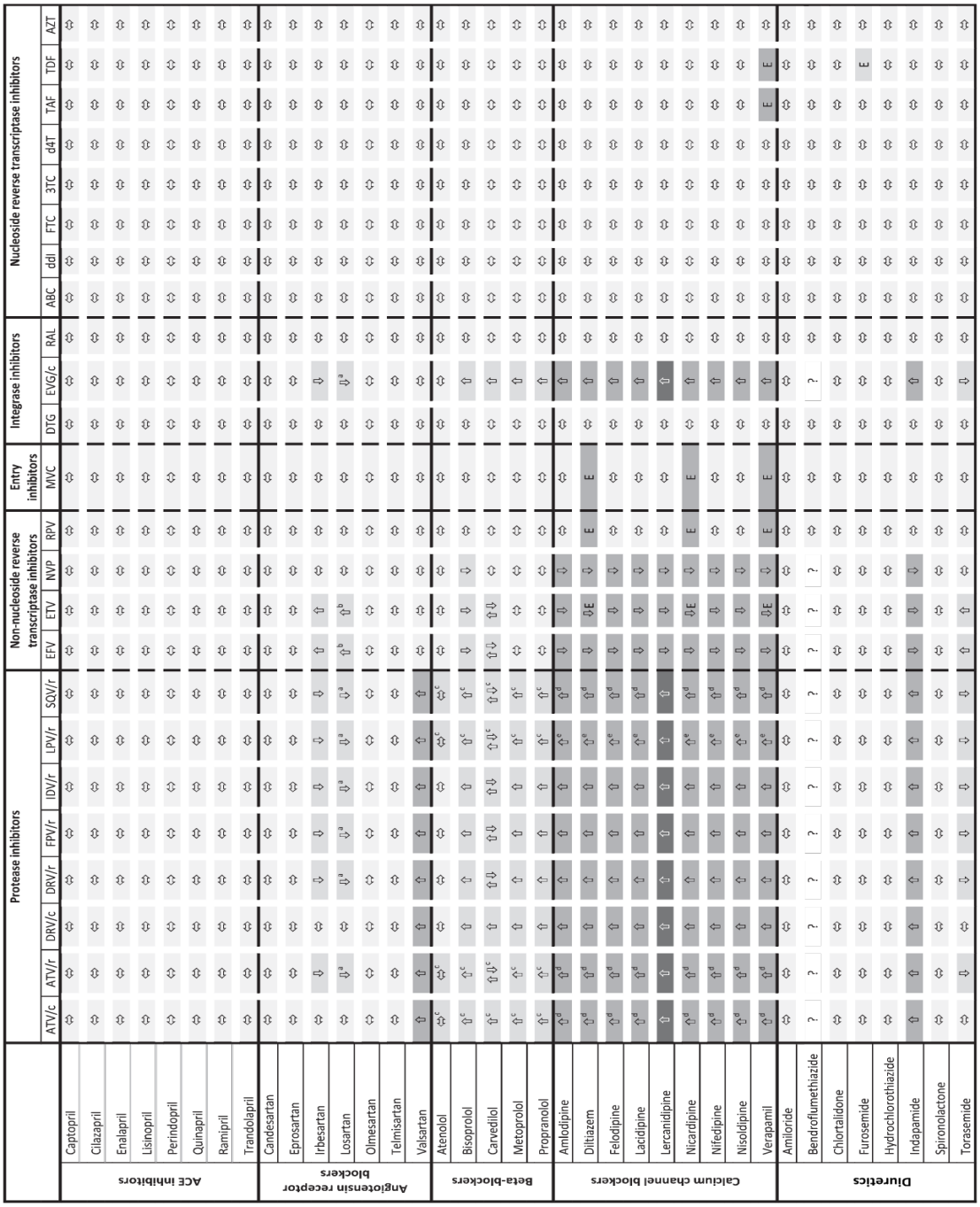
Approach to a Patient with HIV and Hypertension Comorbidity:

It follows the general guideline, but particular attention should be paid to the drug–drug interaction, especially for HIV patients on protease inhibitors (saquinavir) and non-nucleoside reverse transcriptase inhibitors (e.g. tenofovir, lamivudine).

Table 6.2 shows the drug–drug interaction between common antihypertensive and antiretroviral (ARV) medications. Note that protease inhibitors generally increase serum concentration of CCBs, while they decrease that of some ARBs such as losartan. This should be taken into consideration while deciding the doses of antihypertensive medications to use in patients on ARVs.

Table 6.2 Interaction between common antihypertensive and antiretroviral (ARV) medications

Reproduced from Zoest et al.[94]



3TC, lamivudine; ABC, abacavir; ACE, angiotensin-converting-enzyme; ATV, atazanavir; AZT, zidovudine; COBI, cobicistat; d4T, stavudine; ddI, didanosine; DRV, darunavir; DTG, dolutegravir; EFV, efavirenz; ETV, etravirine; EVG, elvitegravir; FPV, fosamprenavir; FTC, emtricitabine; IDV, indinavir; LPV, lopinavir; MVC, maraviroc; NVP, nevirapine; r, ritonavir; RAL, raltegravir; RPV, rilpivirine; SQV, saquinavir; TAF, tenofovir alafenamide fumarate; TDF, tenofovir

Key for drug interaction

⇔, No significant effect.
⇧, Potential elevated concentration of the antihypertensive drug.
⇩, Potential decreased concentration of the antihypertensive drug.
D, Potential decreased concentration of antiretroviral drug.
E, Potential elevated concentration of antiretroviral drug.
?, This interaction has not been studied.
[a]Parental drug decreased but active metabolite increased.
[b]Parental drug increased but active metabolite decreased.
[c]Risk of PR interval prolongation. Partial response interval monitoring may be warranted in patients with underlying heart block or those treated with atrioventricular nodal blocking agents.
[d]ECG monitoring is recommended.
[e]Use with caution as both LPV and calcium channel blockers prolong PR interval. Clinical monitoring is recommended.

No clear data available.
No clinically significant interaction expected.
Potential interaction predicted to be of weak intensity (less than two-fold ↑ area under the curve (AUC) or less than 50% ↓ AUC). A dosage adjustment is a priori not recommended.
Potential interaction, that may require a dosage adjustment or close monitoring.
These drugs should not be co-administered.

Note: although some drug interactions are predicted to potentially require a dosage adjustment based on the drug's metabolic pathway, clinical experience with a particular antihypertensive and antiretroviral drug may indicate that dosage adjustments are not an a priori requirement.

6.11. Hypertension in COVID-19

Severe acute respiratory coronavirus 2 (SARS-CoV-2) has become a worldwide epidemic. In a 2020 metaanalysis[97] which included seven studies and a total of 1,576 COVID-19 infected patients, hypertension was the most prevalent comorbidity, affecting about one in five infected patients. Additionally, among infected patients, those with background hypertension are twice as likely to have severe disease when compared with their normotensive counterparts. It has remained unclear if this relationship was causal or confounded by age and other associated comorbidities including obesity, DM, and CKD.

The viral spike protein of SARS-CoV-2 attaches itself to the cell surface using the angiotensin 2 enzyme (ACE 2) receptor. ACE 2 receptors are upregulated in patients on ARBs or ACEIs.[98,99] This raised initial concerns regarding the use of angiotensin-converting enzyme inhibitors (ACEIs) and ARBs in these patients.

The WHO conducted a rapid review[8] of evidence related to the use of ACEIs or ARBs in COVID-19 patients, which identified 11 observational studies. After adjustment for confounders, history of ACEI or ARB use was not found to be associated with increased severity of COVID-19 illness. This position was supported by another review[100] that included higher-quality studies. A more recent study[101] evaluated whether COVID-19 risk differs according to antihypertensive drug class in patients treated with ACEIs and ARBs compared with CCBs. Their findings suggest a lower COVID-19 risk in patients with hypertension treated over a long period with ACE inhibitors or ARBs compared with CCBs.

Approach to a Patient with Hypertension and COVID-19 Infection:
It is recommended that ACEIs and ARBs should be continued.

6.12. Hypertension in Sickle Cell Disease

Blood pressure is generally lower in individuals with sickle cell anaemia than their age- and sex-matched counterparts with haemoglobin AA.[102,103] Also, the prevalence of hypertension, using the threshold of 140/90 mmHg, in SCD is documented to be lower than in controls.[104] Blood pressure above 130/80 mmHg should be considered as relative systemic hypertension, as this is associated with increased risk of pulmonary hypertension and renal dysfunction.[105] Although glomerulopathies are common in SCD, the development of systemic hypertension is uncommon in SCD patients.[106]

6.13. Hypertensive Urgency and Emergency

Hypertensive emergencies are situations in which severe hypertension (Grade 3) is accompanied by acute life-threatening hypertension-mediated organ damage. It requires immediate reduction of blood pressure using intravenous medications. The following conditions should be treated as hypertensive emergencies:

- Acute left ventricular failure
- Eclampsia and severe pre-eclampsia
- Acute aortic dissection

- Hypertensive encephalopathy
- Malignant hypertension with or without acute kidney injury
- Intracerebral haemorrhage

Clinical Approach to Hypertensive Emergencies: Blood pressure lowering should be accomplished with a short-acting intravenous medication to allow careful titration of the blood pressure response using medications such as labetalol, alpha-methyldopa, and hydralazine.

Hypertensive Urgency: This is a condition where there is severe hypertension, but there is no evidence of ongoing hypertension-mediated target organ damage.

Clinical Approach to Hypertensive Urgency: Administer the regular oral antihypertensive medications with an aim to lower blood pressure over a 24- to 48-hour period. There is no need for hospital admission in this case.

6.14. Hypertension in Stroke Patients

Hypertension is the most prevalent risk factor for both ischaemic and haemorrhagic stroke and has been reported in about 64% of stroke patients.[107] The management of BP in adults with stroke is challenging and complex because of the varied causes of stroke. Furthermore, stroke induces a plethora of haemodynamic changes including labile blood pressure, thus making the decision about BP lowering rather difficult. The pathophysiology of brain damage in each of the stroke types is different, and as such, management should be tailored to the disease type, the diagnosis of which is based on clinical features and brain imaging.

In acute ischaemic stroke, BP may be severely elevated, and rapid reduction in BP is indicated if other comorbid conditions such as acute left ventricular failure or aortic dissection are present. It should be noted, however, that excessive BP lowering may worsen cerebral ischaemia. In the absence of other comorbid conditions, acute BP lowering is not indicated except if the patient is to receive thrombolytics. A 15% lowering of BP over 24 hours is adjudged safe if the BP is above 220/120 mmHg.

For patients with intracranial haemorrhage presenting with SBP between 150 and 220 mmHg and without contraindication to acute BP treatment, acute lowering of SBP to 140 mmHg is safe and can be effective for improving functional outcomes.[108] The use of antihypertensive medications was confirmed to reduce the risk of recurrent stroke after stroke or TIA in a meta-analysis109 that included 10 randomised trials. Inclusion criteria were participants who have had TIA, ischaemic stroke, or intracerebral haemorrhage and were randomised for days to months after the index event and followed up for up to 2 – 5 years. Treatment with antihypertensive medications was associated with a significant reduction in recurrent stroke and so should be initiated a few days after the event.

Approach to Patient:

i. Acute ischaemic stroke:

a. Acute BP lowering in severely elevated BP is indicated if there is evidence of ongoing target organ damage

b. Patients who are eligible for thrombolysis should have their BP lowered to <180/105 mmHg for the first 24 hours after thrombolysis.

c. For patients not going for thrombolysis, BP should be lowered by 15% in the first 24 hours if BP is ≥220/120 mmHg.

ii. In acute haemorrhagic stroke, acute BP lowering to the target level of 140 mmHg is recommended if SBP is between 150 – 220 mmHg.

iii. In patients with hypertension who have an acute cerebrovascular event, antihypertensive treatment should be initiated immediately for TIA or after 10 days for ischaemic stroke.

6.15. Hypertension in Perioperative Conditions

Hypertension in the perioperative period increases the morbidity and mortality associated with the surgical procedure.[110] At the induction of anaesthesia, patients with and without pre-existing hypertension are likely to develop blood pressure elevations and tachycardia.[111] Previous history of hypertension, especially a diastolic blood pressure greater than 110 mmHg, and the type of surgery[112] are common predictors of perioperative hypertension. Surgeries commonly associated with high rates of postoperative hypertension include coronary artery bypass surgery, aortic aneurysm repair, and carotid endarterectomy.

Approach to Patient:

Perioperative assessment should be done at least 1 week before surgery. If BP is well controlled and physical examination is unremarkable, further testing may not be necessary for uncomplicated surgeries or procedures. High-risk patients or patients undergoing complicated surgeries should be referred to a hypertension specialist. Perioperative risk assessment should be focused with a view to requesting perioperative tests including ECG and echocardiography. It is recommended that surgery is postponed until blood pressure is controlled in elective cases. It is recommended that patients should take their oral antihypertensive medication with a sip of water on the day of surgery, but not less than 2 hours before the procedure. Diuretics should be avoided to guard against surgery-dependent volume depletion. Hypertensive urgencies and emergencies may occur and should be treated accordingly with intravenous agents. A treatment algorithm as suggested by Erstad[111] may be considered depending on the availability of medications. Abrupt discontinuation of beta blockers or centrally acting agents such as clonidine is potentially harmful and not recommended.

6.16. Summary of Recommendations in Special Settings

Condition	Recommendations
1. Resistant Hypertension	• Ensure adherence before the diagnosis • Reinforce lifestyle changes, especially sodium reduction • MRA (spironolactoane and eplerenone) should be considered. This may be followed by a higher dose of thiazide diuretics • Centrally acting agents, e.g. alpha-methyl dopa and the direct-acting vasodilators, can be added to the treatment • All patients suspected to have resistant hypertension should be referred to a hypertension specialist
2. Masked Hypertension	• Evaluate for masked hypertension using ABPM or • HBPM in individuals whose office BP is high normal and/or who have DM or HMOD such as CKD • Consider up-titrating treatment and night-time dosing regimen
3. White-Coat Hypertension	• Lifestyle changes aimed at reducing CV risk and periodic out-of-office BP monitoring should be implemented • Routine drug treatment should be considered in highrisk patients or those with HMOD
4. Secondary Hypertension	• Investigate for secondary hypertension in individuals <30 years • Treat any identified underlying cause and administer antihypertensive medications accordingly
5. Hypertension in Pregnancy	• Labetalol, alpha-methyldopa, nifedipine, hydralazine are recommended. In hypertensive crisis situations, IV labetalol and magnesium sulphate should be used • ACEIs, ARBs, direct renin inhibitors and diuretics are contraindicated in pregnancy • If pre-eclampsia is diagnosed, delivery should be expedited if there are presence of adverse conditions such as visual disturbances and haemostatic disorders

Condition	Recommendations
6. Hypertension in DM	• Measure BP standing at first visit and at least once every year during follow-up • Consider HBPM or ABPM in all patients at presentation and at least once yearly • Target BP should be less than 130/80 mmHg
7. Hypertension in CKD	• Consider HBPM or ABPM in all patients at presentation and at least once yearly • Use loop diuretic as against thiazide diuretics if GFR is <30 ml/min • Initiate treatment with an ACEI or ARB combined with either CCB or diuretic • The target BP should be <130/80 mmHg
8. Hypertension in the Elderly	• Measure BP standing on all occasions • Search for other comorbidities and take note of concurrent therapies. Consider possibilities of compelling indications and contraindications to certain therapies
9. Hypertension in Children and Adolescents	• Measure the arm size and use the appropriately sized cuff • Search for secondary causes
10. Hypertension in HIV	• Consider dose adjustments if a patient is on protease inhibitors and non-nucleoside reverse transcriptase inhibitors due to drug-drug interaction
11. Hypertension in COVID-19	• Continue antihypertensive medications including ARBs/ACEIs if a patient was on the medications before COVID-19 infection • Use of tele-monitoring of BP and extended followup time can be considered where possible to reduce crowding

Condition	Recommendations
12. Hypertension in SCD	• Initiate therapy if BP >130/80 mmHg • CCB, ARBs/ACEIs are preferred
13. Hypertensive Urgency/Emergency	• In urgency, oral antihypertensives are recommended with the aim of lowering the BP to target level in 24–48 hours • In hypertensive emergencies, intravenous medications such as labetalol, hydralazines are recommended with the aim of reduction in BP within minutes to hours • Counselling is mandatory before discharge to guard against poor adherence
14. Hypertension in Stroke Patients	• In ischaemic stroke, acute lowering of BP is not indicated except if there is a plan for thrombolysis. If BP is >220/150 mmHg, a 15% reduction over 24 hours is recommended • In haemorrhagic stroke, acute lowering of raised BP to the target level of below 140/90 mmHg is recommended • After a stroke, antihypertensive medication for secondary prevention should commence 10 days following the event
15. White-Coat Hypertension	• In low-risk patients with controlled BP, surgeries can be done without recourse to extensive cardiovascular evaluation • In high-risk patients, further CV evaluation with ECG and echocardiography must precede surgery • On the day of surgery, antihypertensive can be taken with a sip of worker, not less than 2 hours before procedure

CHAPTER 7:
IMPLEMENTATION, MONITORING & EVALUATION, AND RESEARCH GAPS

7.1. Role of Health Workers

Lay Community Health Worker (LCHW)

A lay community health worker is someone who has received a short training meant for a specific intervention (in this case, hypertension) but has not received a formal professional or paraprofessional certificate or tertiary education degree. They may be referred to as village health workers or lay health workers. Use of lay health workers in hypertension screening has been piloted in Nigeria in the Community Action Against Non-Communicable Disease (COMAAND) project,[113] and they were found to be effective (unpublished report). Their role in hypertension management includes the following:

- Measurement of blood pressure for community screening of hypertension
- Referral of suspected hypertensive cases to the primary healthcare centre
- Leading/supporting adherence clubs especially for hypertensive patients
- Supporting tracking and follow-up of patients in the community
- Supporting community refill of antihypertensive medicines for stable patients
- Serving as role models/expert hypertensive patients if they are hypertensive
- Engaging in peer education of community members for group lifestyle modification programmes such as community physical activity.

Nurses and CHOs/CHEWs/JCHEWs:

- Community screening for hypertension
- Confirming diagnosis of hypertension
- Providing culturally relevant and structured health education
- Initiating treatment in low- to moderate-risk patients
- Supporting adherence, tracking, and follow-up of patients in both the facility and the community
- Supporting refill of antihypertensive medicines for stable patients
- Community delivery of medications
- Identifying high-risk patients and referring them to the higher level of health care
- Documentation of services using the relevant tools

Medical Officers:

- Confirmation of diagnosis of hypertension
- Clinical evaluation
- Follow-up of patients with hypertension and other comorbidities
- Prescription of medications including some second-line agents if need be
- Management of hypertension in special settings, including mild pre-eclampsia, stroke, urgencies, and emergencies

Specialists/Consultants/Physicians:

- Confirmation of resistant hypertension
- Management of severe pre-eclampsia/eclampsia
- Hypertension in the setting of CKD and other high-risk patients

7.2. Monitoring of Hypertension Control

Monitoring of hypertension control is the ongoing collection, management, and use of information to assess whether the programme is proceeding according to plan and/or achieving defined targets. It is important to know if healthcare facilities – and ultimately the country – are meeting the agreed goals and objectives for managing hypertension.

Realistic, clear, and measurable outcomes and indicators have been identified that relate to the most important changes expected to result from the programme. In-country, the monitoring tools integrate data for hypertension and diabetes mellitus. These tools are described below:

A. Hypertension and Diabetes Screening Register: This is a register used to document access to hypertension care and treatment services in the facility and community. It is expected that this register will be made available at every service delivery point in the facility. In addition, during campaigns and outreaches, this register will be used for documentation, and the data will be harmonised at the end of each month with the facility register and transferred into the monthly summary form.

B. Hypertension and Diabetes Treatment Card: This tool is used to record and track a patient's response to treatment for hypertension and diabetes. It also provides information for the individual patient's management (e.g. date of previous visit, due date of follow-up, BP and blood sugar control status, longitudinal data of patient's medications) that will enable the healthcare worker to titrate treatment as appropriate.

C. Client Enrolment Register: This is a health facility-based register that documents all patients screened and enrolled in the programme. It provides information on clients who have been diagnosed as hypertensive but are yet to commence medications.

D. Hypertension and Diabetes Treatment Register: This is a register that documents longitudinal records of a patient's blood pressure/blood glucose history. It provides data on the total number of patients that have been initiated on treatment and their treatment response. This register will help in cohort monitoring and patient retention in the programme.

E. Hypertension and Diabetes Monthly Summary Form: This tool helps in summarising data collected from the health facility and community outreaches at the end of the month. It provides at a glance, the summary of hypertension and diabetes activities that have taken place for that month. It also provides data for hypertension and diabetes indicators.

F. DHIS-2 Platform: The District Health Information System version 2 (DHIS-2 Platform) is the electronic health information system that manages data. The hypertension and diabetes data in the country are to be migrated onto the DHIS-2 Platform.

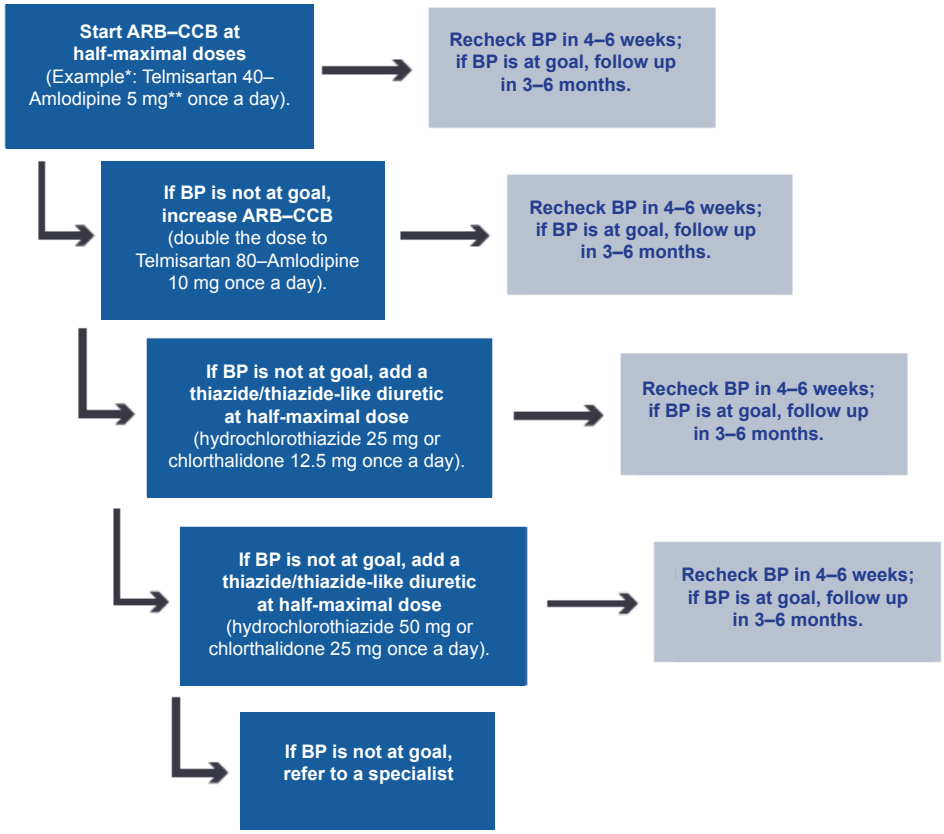
APPENDIX A

WHO TREATMENT ALGORITHM 1

Initiation of treatment with a single pill combination

• Beginning treatment with two antihypertensive drugs from different classes is recommended when baseline BP is ≥20/10 mmHg above goal, and should be considered when baseline BP is 140/90 mmHg.

• Drugs affecting the renin–angiotensin system (ACEis, ARBs, and aliskiren) have been associated with serious fetal toxicity, including renal and cardiac abnormalities and death; they are contraindicated for use during pregnancy.



NOTE: Monitor potassium and kidney function when starting or changing the dose of ACEi/ARB or thiazide/thiazide-like diuretic, if testing is readily available and does not delay treatment.

This protocol is contraindicated for women who are or could become pregnant. Neither an ACEI or ARB should be given to pregnant women.

⁎ The medications mentioned serve as examples and can be replaced with any two medications from any of the three drug classes (ACEis/ARBs, CCBs or thiazide/ thiazide-like diuretics). Start two individual pills or, if available, both in a single-pill combination (fixed-dose combination).

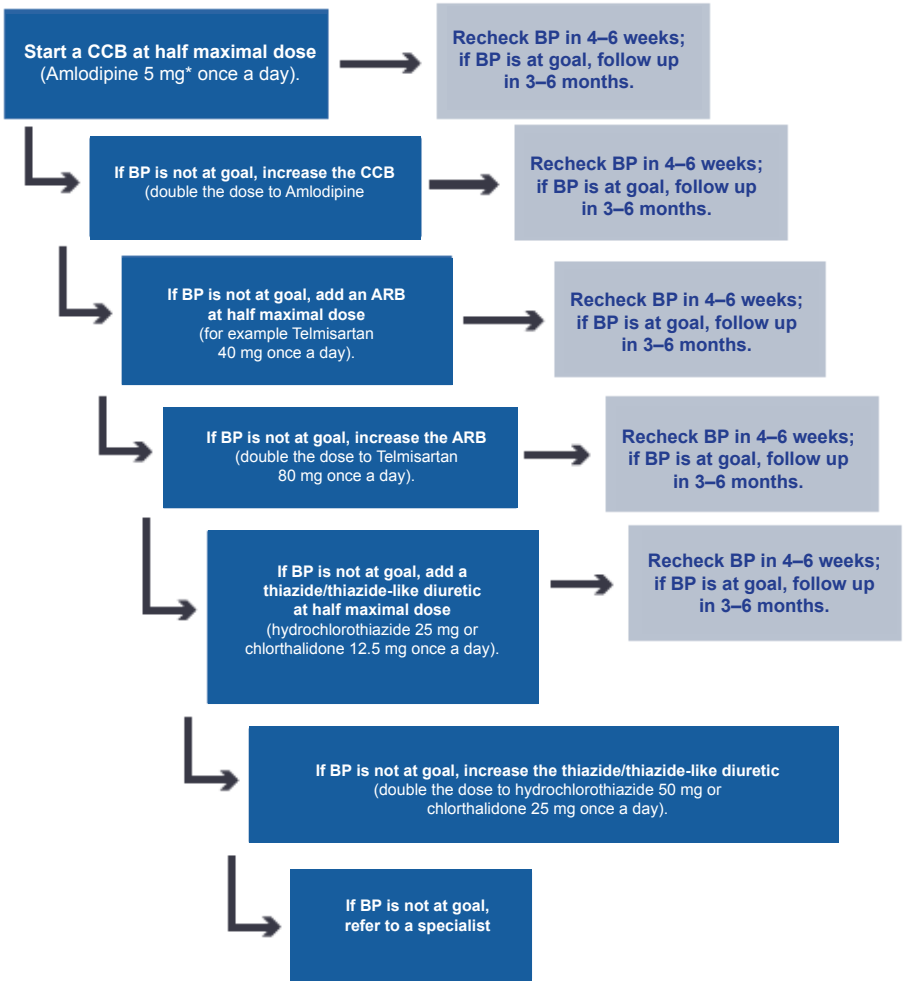
⁎⁎ Can be replaced with other individual pills or, if available, other single-pill combinations (fixed-dose combinations).

APPENDIX B

Initiation of treatment not using a single-pill combination (i.e. with monotherapy or free combination therapy)

• A CCB, rather than a thiazide-type diuretic or ACEi/ARB, was selected as first-line medication if one agent is used, to avoid the need for electrolyte measurements or to alleviate concerns regarding potential change in GFR.

• Drugs affecting the renin-angiotensin-aldosterone system (ACEis, ARBs, and aliskiren) have been associated with serious fetal toxicity, including renal and cardiac abnormalities and death; they are contraindicated for use during pregnancy.



NOTE: Monitor potassium and kidney function when starting or changing dose of ACEi/ARB or thiazide/thiazide-like diuretic, if testing is readily available and does not delay treatment.
This protocol is contraindicated for women who are or could become pregnant. Neither an ACEI or ARB should be given to pregnant women.
⁎ Can be replaced with a thiazide/thiazide-like diuretic or an ACEi or ARB. An ACEi or ARB is preferred for patients with proteinuria.

APPENDIX C

I. Facility Screening Register

SCREENING REGISTER

STATE: LGA:

FACILITY NAME: MONTH: YEAR:

Name of Community (In case of outreach services):

S/N	Date of visit	Hospital No.	PATIENT NAME	ADDRESS	Phone Number	AGE	SEX	BP (sbp/dbp)	Blood Sugar (FBS)	Blood Sugar (RBS)	Visits		New Cases		Previously diagnosed	
											First visit	Second Visit	HTN (Y/N)	DM (Y/N)	HTN (Y/N)	DM (Y/N)

Completed by: Designation:..... Name: ..... Signature: ..... Date: .....

Verified by: Designation:..... Name: ..... Signature: ..... Date: .....

II. Hypertension Treatment Card

Screening, treatment and follow																						
Date (DD/MM/YY)																						
Screening																						
Blood Pressure (SBP/DBP)																						
Blood sugar (FBS)																						
Blood sugar (RBS)																						
Weight (Kg)																						
Waist circumference (cm)																						
SE/U/CR																						
Urinalysis																						
Treatment dose *(Please write dose. example 5mg*																						
Medication Adherence																						
Amlodipine 5mg																						
Amlodipine 10mg																						
Losartan 5mg																						
Losartan 10mg																						
Hydrochlorothiazide 25mg																						
Combination pill (Losartan 100mg/ Hydrochlorothiazide 25mg																						
Metformin 500mg																						
Metformin 1000mg																						
Glibenclamide 5mg																						
Glibenclamide 10mg																						
Side effect/adverse effects of medication																						
Present (Y/N), State type (side effect and Describe)																						
Patient follow-up																						
Next Visit Date (DD/MM/YY)																						
Referred to another health facility (Yes/No)																						

If a patient misses a visit, please contact promptly to return to care:

III. Client Enrollment Register

ENROLMENT REGISTER

FACILITY NAME: **STATE:** **LGA:** **YEAR:**

S/N	Date enrolled (DD/MM/YY)	HOSP No.	PATIENT ID	Patient's name in full	Address (descriptive with landmarks)	Phone number	Sex (M/F)	Age (in yrs)	B/P(mmHg)	Weight/Kg	Height/m	BMI	Waist circumfrence /cm	Blood Sugar (mmol/L)		New case		Previously Diagnosed		Transfer In (Tick if patient was previously enrolled in another facility)	Comments
				Surname First (capital letter)										FBS	RBS	HTN	DM	HTN	DM		

Completed by: Designation:.. Name: .... Signature: .... Date: ....

Verified by: Designation:.. Name: .... Signature: .... Date: ....

IV. Facility Hypertension Treatment

FACILITY TREATMENT REGISTER

FACILITY NAME: STATE: LGA: YEAR: MONTH TREATMENT FOLLOW-UP

WRITE IN MONTHS

	REGISTRATION AND PERSONAL INFORMATION						STATUS AT START OF TREATMENT								STATUS AT START OF TREATMENT											1		2		3		4		5		6		7		8		9		10		11		12							
S/N	Date of registration (DD/MM/YY)	HOSP No.	PATIENT ID	Patient's name in full	Address (descriptive with landmarks)	Phone No.	Sex (M/F)	Age (in yrs)	B/P (mmHg)	Weight /Kg	Height/m	Waist circumfrence/cm	Blood Sugar (mmol/L)		Urinalysis	SE/U/CR	Blood Cholesterol	BMI	Medication	New case		Previouly Diagnosed		Treatment start date		BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP/DM status	Medication /Duration	BP control -Y/N	Medication /Duration	BP/DM status	Medication /Duration	Weight /Kg	Waist circumfrence	BMI	blood cholesterol	SE/U/CR	Patient Status
				Surname First (capital letter)									FBS	RBS						HTN	DM	HTN	DM	HTN	DM																														

BP control - Y, Systolic BP <140 and diastolic BP < 90 during visit to the facility,
BP control - N, Systolic BP ≥140 and diastolic BP ≥ 90 during visit to the facility,
DM control - Y, FBS < 8mmol/L (144mg/dl) ; RBS < 10mmol/L (180mg/dl)
DM control - N, FBS >8 mmol/L (144mg/dl); RBS > 10mmol /L (180mg/dl)
BP control - Y=1, BP uncontrol - N=2, DM control - Y=3, DM uncontrol - N=4, BP control - Y& DM control - Y=5, BP controlled - Y, DM Uncontrolled - N=6, BP Uncontrolled - N, DM controlled - Y=7, BP uncontrol - N& DM uncontrol - N=8
MV- Patient missed a scheduled visit or for recent 1 or blood pressure was not measured or followed up
LTFU - No visit in recent 3 months and treatment status unknown
TO- Patient has been transferred to another facility (Public/Private) to continue treatment
Died - Mention date of death if known
1A- Amlodipine 5mg, 1B- Amlodipine 5mg/losartan 50mg, 1C - Amlodipine 10mg/Losartan 100mg, 1D- Amlodipine 10mg/Losartan 100mg/Hydrochlorothiazide 25mg, 1E - Metformin, 1F - Glibenclamide, 1G - Other medications
Duration of medication dispensed - write in days e.g 1 month, 2 months and 3 months as 30, 60 and 90 respectively
SE/U/CR- write out test results of electrolytes Na=, K=, Cr=
Blood Cholesterol - write values of test result, HDL =, LDL =, Total cholesterol =

Completed by: Designation:...................................... Name: .... Signature: .... Date: ....

Verified by: Designation:...................................... Name: .... Signature: .... Date: ....

V. NCD Monthly Summary Form

NCD MONTHLY SUMMARY FORM

A	Identification		
	Health Facility:	Month:	
	Political Ward:	Year:	
	STATE:	Public:	Private:
	LGA:	Beds:	
	Facility code:		

B	Data Elements	Male											Female											GRAND TOTAL
		18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	67+	Total	18-22	23-27	28-32	33-37	38-42	43- 47	48-52	53-57	58-62	63-67	67+	Total	
	Screening																									
1	Total number screened for raised blood pressure																									
2	Total number screened for diabetes																									
	Diagnosis																									
3	Hypertension new cases																									
4	Previously diagnosed																									
5	Diabetes new cases																									
6	Diabetes old cases																									
	Enrollment and treatment																									
7	Total enrolled on hypertension care																									
8	Total enrolled on diabetes care																									
9	Persons with high blood pressure started on antihypertensive medicines																									
10	Persons with diabetes started on oral glucose lowering drugs (e.g metformin, glibenclamide etc)																									
	Control																									
11	Persons with high blood pressure controlled within 3 months (on the last visit)																									
12	Persons with diabetes controlled within 3 months (on the last visit)																									
	Referral																									
13	Persons with high blood pressure referred out for further treatment																									
14	Persons with diabetes referred out for further treatment																									

15 **Drug Stockout in the past 7days within reporting month** Yes ☐ No ☐

Completed by: Designation:..... Name: ..... Signature: ..... Date: .....

Verified by: Designation:..... Name: ..... Signature: ..... Date: .....

VI. Blood Pressure Screening, Treatment and follow-up and Enrollment and Treatment Card

Blood Pressure screening, treatment and follow-up

Date (DD/MM/YY)				
Screening				
Blood Pressure (SBP/DBP)				
Treatment dose *(Please write dose, example 5mg)*				
Medication Adherence				
Amlodipine 5mg				
Amlodipine 10mg				
Losartan 5mg				
Losartan 10mg				
Hydrochlorothiazide 25mg				
Combination pill (Losartan 100mg/ Hydrochlorothiazide 25mg				
Metformin 500mg				
Metformin 1000mg				
Glibenclamide 5mg				
Glibenclamide 10mg				

Side effect/adverse effects of medication	
Present (Y/N), State type (side effect and Describe)	
Patient follow-up	
Next Visit Date (DD/MM/YY)	
Referred to another health facility (Yes/No)	

If a patient misses a visit, please contact promptly to return to care:

Date contact attempted	Date contact attempted	Date contact attempted	Date contact attempted
○ No response	○ No response	○ No response	○ No response
○ House not found	○ House not found	○ House not found	○ House not found
○ Agreed to return	○ Agreed to return	○ Agreed to return	○ Agreed to return

ENROLMENT AND TREATMENT CARD:
Hypertension and Diabetes

Facility Information

Health Facility Name:	LGA:
Registration date(DD/MM/YY):	Ward/Street:

Patient Information:

ID Number:

SURNAME; FIRST NAME;

Sex(M/F): DOB(DD/MM/YY): Age(yrs)

Height (m^2): Telephone:

Home Address:

Name of treatment supporter: Relationship with treatment supporter: Telephone

Diagnosis

Hypertension	Diabetes
Yes, enrolled ☐	Yes, enrolled ☐
Date enrolled:	Date enrolled:
Yes, treatment initiated ☐	Yes, treatment initiated ☐
Treatment Start Date:	Treatment Start Date:
Yes, Previously on treatment ☐	Yes, Previously on treatment ☐

Other co-morbidity

1. Already on medications for HTN? Yes ☐ No ☐
2. Already on medications for DM? Yes ☐ No ☐
3. Past history of heart attack? Yes ☐ No ☐
4. Past history of stroke? Yes ☐ No ☐
5. Past history of kidney disease Yes ☐ No ☐

Treatment contract: *I understand that I have .....*
I agree to attend all appointments, take my medications, be active, eat healthily and stop smoking.

Patient's signature:	Health worker's signature:	Date:

VII. Pharmacy Work Sheet

PHARMACY WORK SHEET

FACILITY NAME:				LGA:				STATE:				MONTH:				YEAR:		
	REGISTRATION AND PERSONAL INFORMATION								TREATMENT STATUS							REGIMEN		
S/N	DATE OF VISIT	HOSPITAL NO	PATIENT ID	NAME OF PATIENT: Surname First	AGE	SEX		Newly started on medication(HTN)	Medication Regimen Change (HTN)	Medication Refill (HTN)	Newly started on medication (DM)	Medication Regimen Change (DM)	Medication Refill(DM)	Referred out on medication	Amlodipine 5mg	Amlodipine 5mg/Losartan 50mg	Amlodipine 10mg/Losartan 100mg	Amlodipine 10mg/losartan 100mg/HCTZ 25mg
						M	F											

Completed by: Designation:.. Name: .... Signature: .... Date: ....

Verified by: Designation:.. Name: .... Signature: .... Date: ....

VIII. Request Issue and Receipt Form

REQUEST ISSUE AND RECEIPT FORM

REPORTING PERIOD		STARTING MONTH						ENDING MONTH				YEAR		
FACILITY NAME							STATE				LGA			
Columns		A	B	C	D	E	F	G	H	I	J	K	L	M
	Product description	Stock balance at beginning of 2 months reporting circle	Qty received over the last 2 months	Cons over the last 2 months	Losses	Adjustment	stock on hand (A+B) - (C+D+E)	Physical Count	AMC C ÷2	Max Qty H × 4	Order Qty I - G	Unit	To be completed by the supplier: Qty approved /supplied	Comments
1	Amlodipine 5mg													
2	Amlodipine 10mg													
3	Losartan 50mg													
4	Losartan 100mg													
5	Losartan 50mg/HCTZ 12.5MG													
6	Losartan 100mg/HCTZ 25MG													
7	Hydrochlorothiazide 25 mg													
8	Metformin 500mg													
9	Glibenclamide 5mg													
10	Metformin 1000mg													
11	Glibenclamide 10mg													

REQUISITION				ISSUING			
Prepared by:		DATE:		Prepared by:		DATE	
				Authorized by:		DATE	
Authorized by:		DATE:		Supplied by:		DATE	

Footnotes
Drugs Expiring in the next 6months
Name of Drug:
Batch Numbers:
Expiring Date:

IX. Daily Consumption Record

DAILY CONSUMPTION RECORD

MONTH | YEAR

STATE | LGA | SDP

No	Product Name	Unit	Begin Bal	Qty Rec'd	Quantity dispensed on every working day																											Quantity dispensed every month						
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	To Client	To CBD	Total	Losses	Adjustment (negative & Positive)	Close Balance	Comments
			A	B																														C	D	E	F	G	H	
																																		Q1+Q2+Q3+...Q22+Q23+Q		C+D			(A+B)- (E+F+G)	
1	Amlodipine 5mg																																						
2	Amlodipine 10mg																																						
3	Losartan 50mg																																						
4	Losartan 100mg																																						
5	Losartan 50mg/HCTZ 12.5MG																																						
6	Losartan 100mg/HCTZ 25MG																																						
7	Hydrochlorothiazide 25 mg																																						
8	Metformin 500mg																																						
9	Glibenclamide 5mg																																						
10	Metformin 1000mg																																						
11	Glibenclamide 10mg																																						
12																																						

Completed by: Designation:..... Name: ..... Signature: ..... Date: .....

Verified by: Designation:..... Name: ..... Signature: ..... Date: .....

APPENDIX D

Normal Range of Body Weight According to Height

BASED ON BMI (WEIGHT (KG) / HEIGHT IN M2) OF 18.5 AND 25

HEIGHT	NORMAL BODY WEIGHT RANGE	
(cm)	Lowest (kg)	Highest (kg)
200	74	100
199	73	99
198	73	98
197	72	97
196	71	96
195	70	95
194	70	94
193	69	93
192	68	92
191	67	91
190	67	90
189	66	89
188	65	88
187	65	87
186	64	86
185	63	86
184	63	85
183	62	84
182	61	83
181	61	82
180	60	81
179	59	78
178	59	79
177	58	78
176	57	77
175	57	77

HEIGHT	NORMAL BODY WEIGHT RANGE	
(cm)	Lowest (kg)	Highest (kg)
174	56	76
173	55	75
172	55	74
171	54	73
170	53	72
169	53	71
168	52	71
167	52	70
166	51	69
165	50	68
164	50	67
163	49	66
162	49	66
161	48	65
160	47	64
159	47	63
158	46	68
157	46	62
156	45	61
155	44	60
154	44	59
153	43	59
152	43	58
151	42	57
150	42	56

NORMAL BODY WEIGHT RANGE = BMI BETWEEN 18.5 & 25

APPENDIX E

Hypertension Service Availability and Readiness Assessments Form
Checklist on availability of hypertension care services and essential medicines and technology for treatment of hypertension

1. Location of PHC (a) urban [ ] (b) semi-urban [ ] (c) rural [ ]

2. Profession of officer-in-charge in PHC facility (a) Doctor [ ] (b) Nurse [ ] (c) Community Health Extension Worker [ ] (d) others (specify) .....

3. Presence of a pharmacy technician in PHC facility (a) Yes [ ] (b) No [ ]

4. Presence of a laboratory technician in PHC facility (a) Yes [ ] (b) No [ ]

5. Presence of a laboratory screening point in PHC facility (a) Yes [ ] (b) No [ ]

6. Inspection of PHC facility by appropriate regulatory body in the last year (a) Yes [ ] (b) No [ ]

Services for hypertension care

7. Do providers in this facility diagnose and/or manage cardiovascular diseases such as hypertension in patients? (a) Yes [ ] (b) No [ ]

8. Do you have the National Guidelines for Diagnosis and Management of Hypertension available in this facility today? IF AVAILABLE, ASK TO SEE THE DOCUMENT (a) Yes [ ] (b) No [ ]

9. Has any of the providers gone for any training on management of hypertension in the last year? (a) Yes [ ] (b) No [ ]

10. Do you have specific clinic days for hypertension services? (a) Yes [ ] (b) No [ ]

Essential medicines for hypertension

11. Amiloride + hydrochlorothiazide (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ].
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

12. Amlodipine (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

13. Atenolol (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

14. Bendrofluazide (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

15. Captopril (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

16. Hydralazine (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

17. Labetalol (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

18. Lisinopril (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

19. Losartan (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

20. Methyldopa (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

21. Nifedipine (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

22. Nimodipine (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

23. Propranolol (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

24. Reserpine + dihydroergocristine + clopamide (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

25. Valsartan (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Expired [ ] (b) Not expired [ ] (c) Price per monthly dose.....

Technology for hypertension

26. Sphygmomanometer (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

27. Stethoscope (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

28. Test kit for urinalysis (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

29. Lipid profile testing (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

30. Glucometer (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

31. Weighing scale (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

32. Measuring tapes (a) Seen [ ] (b) Reported not seen [ ] (c) Not available [ ]
If seen, (a) Functioning [ ] (b) Not functioning [ ] (c) Don't know [ ]

APPENDIX F

NAFDAC Pharmacovigilance Form

NATIONAL PHARMACOVIGILANCE CENTRE (NPC) NIGERIA

National Agency for Food and Drug Administration & Control (NAFDAC), Headquarters Office
Plot 2032 Olusegun Obasanjo Way
Wuse Zone 7 Abuja

Tel: 08086200571 or Fax: 09-5241108

FORM FOR REPORTING OF SUSPECTED ADVERSE DRUG REACTIONS

IN STRICT CONFIDENCE

1. * PATIENT'S DETAILS

Full Name or Initials: _____ Patient Record No: _____

AGE/DATE OF BIRTH: _____ SEX: M ☐ F ☐ WEIGHT (kg): _____

HOSPITAL/Treatment Centre: _____

2. * ADVERSE DRUG REACTION (ADR)

A. DESCRIPTION

DATE Reaction Started	DATE Reaction Stopped

C. OUTCOME OF REACTION
TICK AS APPROPRIATE

☐ Recovered fully ☐ Recovered with disability (Specify)

☐ Congenital Abnormality (Specify) ☐ Life Threatening (Specify)

☐ Death ☐ Others (specify)

B. Was Patient Admitted Due to ADR Yes ☐ No ☐

If Already Hospitalized, Was it Prolonged Due to ADR Yes ☐ No ☐

Duration of Admission (days) _____

Treatment of Reaction: _____

3. * SUSPECTED DRUG (Including Biologicals Traditional/Herbal Medicines & Cosmetics)

A. DRUG DETAILS (State name and other details if available / Attach product label / Sample (if available)

Brand Name: _____ Generic Name: _____ Batch No: _____

NAFDAC No: _____ Expiry Date: _____

Name & Address of Manufacturer: _____

B. Indications for Use	Dosage	Route of Administration	Date Started	Date Stopped

4. * CONCOMITANT MEDICINES (All medicines taken within the last 3months including herbal and self medication)

Brand or Generic Name	Dosage	Route	Date Started	Date Stopped	Reason for Use

5. * SOURCE OF REPORT:

Name of Reporter: _____

Address: _____

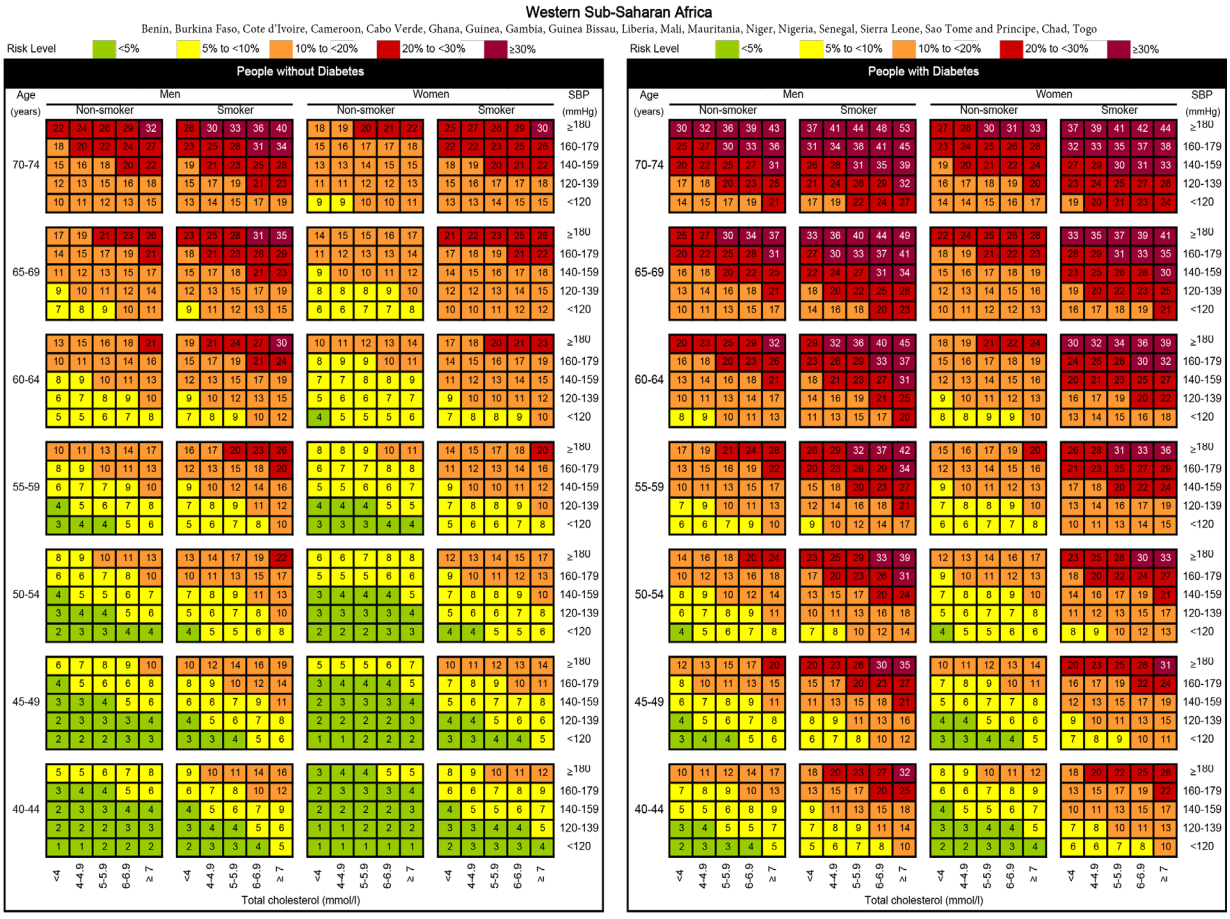
Profession: _____

Signature: _____ Tel No/E-mail: _____

*: MANDATORY FIELDS

APPENDIX G

WHO Cardiovascular Disease Risk Laboratory-based Chart



Western Sub-Saharan Africa

WHO Cardiovascular Disease Risk Non Laboratory Based Charts

Western Sub-Saharan Africa

Benin, Burkina Faso, Cote d'Ivoire, Cameroon, Cabo Verde, Ghana, Guinea, Gambia, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Sao Tome and Principe, Chad, Togo

Risk Level: <5% | 5% to <10% | 10% to <20% | 20% to <30% | ≥30%

Non-laboratory based risk chart

Age (years)	Men: Non-smoker					Men: Smoker					Women: Non-smoker					Women: Smoker					SBP (mmHg)
	<20	20-24	25-29	30-35	≥ 35	<20	20-24	25-29	30-35	≥ 35	<20	20-24	25-29	30-35	≥ 35	<20	20-24	25-29	30-35	≥ 35	
70-74	23	24	26	28	30	29	31	33	36	38	20	21	21	22	23	29	30	31	32	33	≥180
	19	20	21	23	25	24	26	28	30	32	17	17	18	18	19	24	25	26	27	28	160-179
	15	16	17	19	20	20	21	23	24	26	14	14	15	15	16	20	21	21	22	23	140-159
	12	13	14	15	16	16	17	18	20	21	11	12	12	13	13	17	17	18	18	19	120-139
	10	11	11	12	13	13	14	15	16	17	9	10	10	10	11	14	14	15	15	16	<120
65-69	17	19	21	22	24	24	26	29	31	34	15	16	17	17	18	24	25	26	27	29	≥180
	14	15	16	18	20	19	21	23	25	27	12	13	13	14	15	20	21	21	22	23	160-179
	11	12	13	14	16	15	17	18	20	22	10	10	11	11	12	16	17	17	18	19	140-159
	9	9	10	11	12	12	13	15	16	18	8	8	9	9	9	13	13	14	15	15	120-139
	7	7	8	9	10	10	11	12	13	14	6	7	7	7	8	10	11	11	12	12	<120
60-64	13	15	16	18	20	20	22	24	27	30	12	12	13	14	14	20	21	22	24	25	≥180
	10	11	13	14	16	16	17	19	21	24	9	10	10	11	11	16	17	18	19	20	160-179
	8	9	10	11	12	12	13	15	17	19	7	8	8	8	9	13	13	14	15	16	140-159
	6	7	7	8	9	9	10	12	13	15	6	6	6	6	7	10	11	11	12	12	120-139
	5	5	6	6	7	7	8	9	10	11	4	5	5	5	5	8	8	9	9	10	<120
55-59	10	11	13	14	16	16	18	21	23	26	9	10	10	11	11	17	18	19	20	21	≥180
	8	9	10	11	12	12	14	16	18	20	7	7	8	8	8	13	14	15	16	16	160-179
	6	6	7	8	9	9	11	12	14	16	5	5	6	6	6	10	11	11	12	13	140-159
	4	5	5	6	7	7	8	9	10	12	4	4	4	5	5	8	8	9	9	10	120-139
	3	4	4	5	5	5	6	7	8	9	3	3	3	3	4	6	6	7	7	7	<120
50-54	8	9	10	11	13	13	15	18	20	23	7	7	8	8	9	14	15	16	17	18	≥180
	6	6	7	8	10	10	11	13	15	18	5	5	6	6	6	11	11	12	13	14	160-179
	4	5	5	6	7	7	8	10	11	13	4	4	4	4	5	8	9	9	10	10	140-159
	3	3	4	5	5	5	6	7	8	10	3	3	3	3	3	6	6	7	7	8	120-139
	2	2	3	3	4	4	5	5	6	7	2	2	2	2	3	4	5	5	5	6	<120
45-49	6	7	8	9	11	11	13	15	17	20	5	6	6	6	7	12	13	14	15	16	≥180
	4	5	6	7	8	8	9	11	13	15	4	4	4	5	5	9	9	10	11	11	160-179
	3	3	4	5	5	6	7	8	9	11	3	3	3	3	3	6	7	7	8	8	140-159
	2	2	3	3	4	4	5	6	7	8	2	2	2	2	2	5	5	5	6	6	120-139
	1	2	2	2	3	3	3	4	5	6	1	1	2	2	2	3	4	4	4	4	<120
40-44	5	5	6	7	9	9	11	13	15	18	4	4	5	5	5	10	11	12	12	13	≥180
	3	4	4	5	6	6	7	9	11	13	3	3	3	3	4	7	8	8	9	10	160-179
	2	3	3	4	4	4	5	6	8	9	2	2	2	2	3	5	5	6	6	7	140-159
	1	2	2	2	3	3	4	4	5	6	1	1	2	2	2	4	4	4	4	5	120-139
	1	1	1	2	2	2	3	3	4	5	1	1	1	1	1	2	3	3	3	3	<120

Body mass index (kg/m^2)

Western Sub-Saharan Africa

APPENDIX H

Hypertension Indicator Sheet

Below are standard indicators that are expected to provide unbiased metrics toward achieving the national target.

Indicator Parameters	Details
Name of Indicator	**Hypertension detection from opportunistic screening**
Relevance	To determine the efficiency of opportunistic screening
Definition	Proportion of adults who were diagnosed with hypertension among those who were screened for hypertension in the facility (including community-based screening)
Calculation	Numerator – Number of adults who were diagnosed with hypertension among those who were screened for hypertension at the facility in the last quarter Denominator – Total number of adults who were screened for hypertension at the facility in the last quarter
Recommended Target	
Sources of data	Facility Screening Register
Frequency of reporting	Monthly

Indicator Parameters	Details
Name of Indicator	**Number of new hypertensive cases**
Relevance	To determine the level of screening outcomes
Definition	Number of persons 18 yrs and above that were screened and newly diagnosed with hypertension (had an elevated BP SDP≥140, DBP≥90 after two measurements during their visit to the health facility in 1 month)
Calculation	Numerator – N/A Denominator – N/A
Recommended Target	Zero
Sources of data	Screening Register, Enrolment Register
Frequency of reporting	Monthly

Indicator Parameters	Details
Name of Indicator	**3–6-monthly BP control (cohort-based)**
Relevance	To measure the effectiveness of clinical services among cohorts of patients treated for hypertension
Definition	Proportion of people with hypertension whose blood pressure is controlled, 3 months after treatment initiation
Calculation	Numerator – Number of people with controlled blood pressure at the last clinical visit in the reporting quarter among those registered for hypertension treatment in the quarter that ended 3 months previously Denominator – Total number of people with hypertension registered for treatment in the quarter that ended 3 months previously
Recommended Target	80%
Sources of data	Health facility patient registers, patient records
Frequency of reporting	Quarterly

Indicator Parameters	Details
Name of Indicator	**Cross-sectional control**
Relevance	To monitor progress towards population hypertension control with programme (disaggregate to compare facilities)
Definition	Proportion of people with hypertension whose blood pressure is controlled in a given geographical area
Calculation	Numerator: Number of people registered with hypertension treatment in the facility, whose BP was controlled at the last clinical visit in the reporting period, excluding those who were newly diagnosed with less than 3 months of treatment Denominator: Total people registered with hypertension treatment in the facility, whose BP was controlled at the last clinical visit in the reporting period, excluding those who were newly diagnosed with less than 3 months of treatment
Recommended Target	80%
Sources of data	Health facility patient registers, patient records
Frequency of reporting	Quarterly

Indicator Parameters	Details
Name of Indicator	**Population control**
Relevance	To assess the programme's ability to identify people with hypertension in the area served
Definition	Proportion of people who have been registered as hypertensive of those estimated to have hypertension in the catchment area.
Calculation	Numerator – Number of adult patients who have been registered as diagnosed with hypertension (>140 mmHg and >90 mmHg or taking medications) in the catchment area in a specific period of time (month, quarter, year) Denominator – Expected number of adults with hypertension based on best estimate of age-adjusted prevalence of hypertension (based on physical measures surveys) in the catchment area in a specific period of time (month, quarter, year)
Recommended Target	80%
Sources of data	Health facility patient registers, patient records
Frequency of reporting	Quarterly

Indicator Parameters	Details
Name of Indicator	**Loss to follow-up (3 months)**
Relevance	To assess the quality of hypertension management
Definition	Proportion of people with hypertension who were lost to follow-up
Calculation	Numerator – Total number of people with hypertension who were lost to follow-up (missed scheduled visits in the last 3 months and unknown status) Denominator – Total number of people with hypertension started on treatment prior to the last 3 months
Recommended Target	<20%
Sources of data	Health facility treatment registers, patient records
Frequency of reporting	Quarterly

Indicator Parameters	Details
Name of Indicator	**Antihypertensive and CVD core medicine availability**
Relevance	To ensure uninterrupted supply of essential medicines and thereby improve patient treatment adherence
Definition	Proportion of health facilities in a given geographical area that have antihypertensive and cardiovascular disease (CVD) core medicines based on treatment protocol
Calculation	Numerator – Number of health facilities reporting "no stock-out" of antihypertensive and CVD core medicines in the last quarter Denominator – Total number of health facilities
Recommended Target	100%
Sources of data	Health facility medicine stock register; health facility reports, logistics information system
Frequency of reporting	Quarterly

Indicator Parameters	Details
Name of Indicator	**Availability of validated devices for BP measurement**
Relevance	To assess the quality of blood pressure measurements
Definition	Definition – Proportion of health facilities that have access to a functional (validated and if applicable, calibrated) blood pressure measurement device in a given geographical area
Calculation	Numerator – Number of health facilities that have access to a functional (validated and, if applicable, calibrated) blood pressure measurement device Denominator – Total number of health facilities
Recommended Target	100%
Sources of data	Health facility reports, surveys
Frequency of reporting	Annually

Note: Blood pressure is considered controlled when systolic blood pressure (SBP) <140 mmHg and diastolic blood pressure (DBP) <90 mmHg.

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