ISH Paper

2026 ISH guidelines for the management of hypertension in Africa: the International Society of Hypertension (ISH) African Regional Advisory Group and the Pan African Society of Cardiology (PASCAR)

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Hypertension in sub-Saharan Africa is escalating, with many cases undiagnosed and poorly controlled, even among children, despite its significant contribution to cardiovascular disease. Poor blood pressure control is largely due to limited national guidelines, underfunded programs, and a shortage of trained health professionals. Simplified protocols for non-physician health workers, who deliver most of the primary care, are essential. Cultural myths and misconceptions further delay care, underscoring the need for community-based education. Early and opportunistic screening, including in schools, markets, and places of worship, is vital across the life course. Sustainable progress depends on tailored strategies, investment in equipment and training, and leveraging existing infrastructure to improve hypertension detection and management. Africa-centred hypertension guidelines are now a priority because international models fail to address the continent's unique clinical, cultural and resource realities. The African Regional Advisory Group of the International Society of Hypertension worked with the Pan African Society of Cardiology to develop simplified protocols for primary care, particularly for non-physician

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health care workers, by considering the special situation and condition for managing the vast majority of cases within hypertension in Africa.

Keywords: African Regional Advisory Group, guidelines, hypertension, International Society of Hypertension, non-physician health workers, Pan African Society of Cardiology

Abbreviations: AAP, American Academy of Paediatrics; ABP, Mambulatory blood pressure monitoring; ACC, American College of Cardiology; ACE, iangiotensin converting enzyme inhibitor; ACR, albumin–creatinine ratio; AHA, American Heart Association; AHS, African Hypertension School; ARB, angiotensin receptor blocker; BP, blood pressure; CCB, calcium channel blockers (long-acting dihydropyridine); CKD, chronic kidney disease; CVD, cardiovascular disease; D, thiazide-like diuretic; DASH, Dietary Approaches to Stop Hypertension; DASS-21, Depression, Anxiety, Stress Scale – 21 items; ECG, electrocardiogram; eGFR, estimated glomerular filtration rate; ESC, European Society of Cardiology; ESH, European Society of Hypertension; GLP-1, glucagon-like peptide-1; HBPM, home blood pressure monitoring; HIV, human immunodeficiency virus; HMOD, hypertension-mediated organ damage; ISH, International Society of Hypertension; LMICs, low- and middle-income countries; m, Healthmobile health; MRA, mineralocorticoid receptor antagonist; NG, nasogastric; NHCW, non-healthcare community workers; NPHW, non-physician healthcare workers; OTC, over the counter; PASCAR, Pan-African Society of Cardiology; PEN, Package of Essential Non-communicable Disease Interventions; PHQ-4, Patient Health Questionnaire-4; RAG, Regional Advisory Group; SGLT-2, sodium-glucose like transporter-2; SPC, single pill combination; SSA, sub-Saharan Africa

THE FOCUS OF HYPERTENSION GUIDELINES IN AFRICA

Background

The prevalence of cardiovascular diseases (CVD) has risen in sub-Saharan Africa (SSA) by over 50% in the last 30 years with an increasing incidence among the youth, contributing to excessive disability-adjusted life years [1–3]. Alarmingly, recent data show a continuing increase in the incidence of hypertension [4], with a significant number of undiagnosed cases in the population [5], and high prevalence rates reported in children [6]. Among diagnosed adults, only about 8–15% have their blood pressure (BP) under control [7,8], putting them at the same risk of organ damage as the undiagnosed [9–11]. The lack of hypertension control may be partly explained by the absence of published hypertension guidelines in 39 of Africa's 54 countries [12] and the lack of a coordinated continental strategy; but, a more fundamental barrier is the limited domestic prioritisation and funding, which leaves hypertension programmes under-resourced compared to donor-funded initiatives like care for human immunodeficiency virus (HIV) infection, tuberculosis, and malaria. Without sustained investment in equipment, medication, and workforce training, even well-developed guidelines and strategies are unlikely to yield meaningful impact. Africa-specific hypertension guidelines are urgently needed because African populations face unique challenges, including higher likelihood of salt sensitivity [13], end-organ damage, high rates of comorbid heart failure from both rheumatic and hypertensive heart disease, high prevalence of HIV infection with distinct care integration opportunities, and a genetic predisposition (APOL-1) to kidney disease driving secondary and resistant hypertension [14]. Addressing these realities requires tailored solutions such as a low threshold for baseline cardiac imaging, early initiation of single-pill combination therapy, and leveraging existing care infrastructure to optimize hypertension management across the continent, as recognized by the Pan-African Society of Cardiology (PASCAR) [15,16].

Rationale and approach

This guideline serves as a guide to the minimum acceptable standard of care and does not replace the practitioner's clinical acumen. The 2020 International Society of Hypertension (ISH) guideline highlighted a need for developing guidelines tailored to SSA that are unique and sustainable [17]. Despite the high burden of hypertension, Africa has lacked a harmonized continental guideline, and previous international guidelines often did not address contextual realities such as the shortage of physicians. To bridge this gap, the provisions in this guideline emphasize simplified protocols for primary care, particularly for non-physician healthcare workers (NPHWs), while covering a wide range of patients; those with primary hypertension, secondary hypertension, resistant hypertension, pregnancy, chronic kidney disease (CKD), and diabetes mellitus. Additionally, there are considerations for older adults and children with hypertension. This guideline document will therefore guide both physicians and NPHWs to diagnose, investigate and start treatment of hypertension, with clear indications on when to refer to the next level of care or seek support for further assessment and management. The Guideline Committee was commissioned in June 2023 by the African Regional Advisory Group (RAG) of the ISH, comprising cardiologists, internists, nephrologists and hypertension experts from across Africa and other regions of the world. The Committee conceptualized thematic areas of interest to the African setting, with a focus on care by NPHWs. Evidence was reviewed predominantly from African hypertension research articles and guidelines, with some reference mainly to ISH [17], but also the European Society of Hypertension (ESH)/European Society of Cardiology (ESC) [18] and American Academy of Paediatrics (AAP) [19] hypertension management guidelines. The draft was discussed at the committee level and decisions taken by consensus, in keeping with current evidence. External contributions were solicited from experts in diverse fields across SSA. Peer review and internal validation were also ensured by members of ISH Council and PASCAR.

HYPERTENSION IN AFRICA

Burden of hypertension

Hypertension is a leading driver of Africa's growing CVD burden, responsible for over half of the heart failure, stroke and ischaemic heart disease cases, as well as significant

maternal and foetal mortality [20–23]. The lifetime risk of developing hypertension is as high as 70% [24], and prevalence is projected to reach 216 million people by 2030, up from 55 million in 1990 [15]. Alarmingly, childhood and adolescent hypertension, linked to obesity, undernutrition, poor birth outcomes, and environmental risks, affects around one in five young people yet remains under-recognized [6,25]. This escalating burden underscores the urgent need for integrated strategies addressing both adult and childhood hypertension to curb the long-term impact on families, health systems, and economic productivity across the continent.

Blood pressure control

The low hypertension control rate is of particular concern, as it is believed that in SSA, good BP control can prevent up to 250 000 hypertension-related deaths annually [11]. A systematic review and meta-analysis by Bosu and Bosu showed a pooled prevalence of 27% with low (6%) control rates [10]. Achieving optimal control requires a multipronged strategy across the life course. While patients with their individual knowledge and cultural beliefs play a key role [26], the prevailing systems of care need to be interrogated. The absence of adequately trained healthcare professionals, access to quality care and medications, and a poor caregiver-patient relationship invariably result in a wider treatment gap with a concomitant reduction in the number of patients who achieve treatment targets.

Capacity of African countries to manage hypertension

Hypertension control in SSA faces several challenges in implementation. The number of physicians per population in Africa is abysmal [2,5,12], with about 5 physicians per 10 000 people, compared to the global average density of physicians of 17/10 000 population [2]. The number of specialists, including cardiologists is even less [27], resulting in a greater reliance on NPHWs or non-health care community workers (NHCWs) who may not be adequately trained in the detection and optimal management of hypertension. Evidence from low- and middle-income countries (LMICs) in Africa and elsewhere shows that targeted training improves the effectiveness of NPHW-led models of hypertension care in lowering BP and reducing cardiovascular risk [28–30]. However, existing guidelines do not include recommendations for NPHWs, who run many African health facilities with minimal supervision by medical doctors.

Only about 45% of countries in SSA allocate the recommended minimum of 5% of gross domestic product to health care, limiting access to medicines, diagnostic tests and large-scale preventive health interventions [31]. Clinical inertia in initiating or intensifying treatment also contribute significantly to poor control [12]. Should a diagnosis be made, poor insurance coverage and poverty often limit the access to effective and affordable medicines, ultimately contributing to poor treatment and control [2,12]. This is completely absent in the paediatric setting, unless a child is diagnosed with severe or secondary hypertension and would need to see a paediatric specialist. In young children, hypertension is more commonly secondary, but in adolescents essential hypertension is more common [32]. Adherence to therapy is also a common issue. Patients frequently require two to three antihypertensive medications in addition to lifestyle changes to achieve optimal BP control [17]. Single pill combination (SPC) or fixed dose combination pills have been shown to reduce regimen complexity and thus improve medication adherence [33–36], significantly improving the rate of BP control and reducing the risk of cardiovascular events and death [35,37]. While SPC or fixed dose combination pills are proven to be safe [13], they are relatively costlier in African countries. However, patient adherence is determined by complex interactions between their beliefs and willingness to take medications.

In many African contexts, pervasive myths undermine effective hypertension management and contribute to poor cardiovascular outcomes [38,39]. Common misconceptions include the belief that medication is no longer necessary once BP is controlled, that all antihypertensive drugs cause erectile dysfunction, and that herbal remedies offer a definitive cure [40,41]. Additionally, lifestyle modifications are often dismissed as irrelevant when on treatment, and complications such as stroke, heart failure, and kidney disease are frequently attributed to supernatural causes. These beliefs delay appropriate care and highlight the urgent need for culturally sensitive education and community-based interventions.

SCREENING AND DIAGNOSING HYPERTENSION

BP screening across the life course remains critical to detect at-risk individuals and to prevent CVD onset [32]. While BP is a vital sign, it is not consistently measured routinely in adults, and even less so in the paediatric setting, especially in Africa which has no current recommendation or guideline to that effect. Evidence of BP-related cardiovascular damage in the youth, including markers that reliably predict adult heart disease, makes early screening and treatment of hypertension essential to preserving cardiovascular health [42,43]. The European and American guidelines indicate that BP should be measured annually from the age of 3 years in children [19,44]. Although the rationale for starting BP screening at age 3 is unclear and challenging, there are good reasons for BP screening in children under and above the age of 5 years. To rule out secondary causes of hypertension, screening under 5 years remains critical in the clinical setting [45]. Due to several methodological challenges and limited paediatric cuff sizes, opportunistic screening for primary hypertension and at-risk children above 5 years (school-aged children) seems more reasonable [32]. Screening in non-traditional settings such as schools, mosques and churches, markets, and barbershops complement clinical consultations and serve as an effective strategy for detecting undiagnosed cases and initiating appropriate treatment and long-term management of hypertension [38,46,47]. The global *May Measure Month* is a good example of such screening and awareness initiatives [48], although yet to be extended to the younger (<18 years) population with initiatives such as the *Childhood Hypertension Consortium of Africa* (CHCAfrica) (Box 1).

Box 1 Screening in children

- Opportunistic screening should be routinely done at all paediatric out-patient clinics and all international screening/awareness programmes in schools and other public places for children aged ≥5 years, using validated BP devices.
- Appropriate range of BP cuff sizes and age-and-sex percentile BP charts should be available in paediatric out-patient clinics.

Hypertension definitions

In adults aged 18 years and above, hypertension will be defined in this guideline as office systolic ≥140 mmHg and/or a diastolic BP ≥90 mmHg [18], and not ≥130/80 mmHg as defined by the American College of Cardiology (ACC)/American Heart Association (AHA) [49], due to the lack of practicality in Africa. In children, there is non-consensus among the various global north guidelines that are available [50]. For defining hypertension in children (<13 years) and adolescents (≥13 years and <16 years), this guideline will follow the recommendations from the 2017 AAP Clinical Practice Guideline that developed BP criteria in a reference population excluding youth with overweight and obesity [19]. While BP nomograms are still in development on the African continent as a collective effort by the CHCAfrica, this guideline supports the efforts for consistent global diagnostic criteria for hypertension in the youth [50]. In Table 1, we concurrently listed the diagnostic criteria for youth alongside adult criteria.

Office BP refers to BP measurement in the hospital setting, at a doctor's office, or in other healthcare facilities for outpatients. Elevated office/clinic BP should be confirmed in at least 2 separate visits, unless there is evidence of hypertension-mediated organ damage (HMOD), and/or stage 2 hypertension [51]. Hypertension variants include white coat hypertension, masked hypertension and resistant hypertension and are identifiable by home BP monitoring (HBPM) or ambulatory BP monitoring (ABPM) [52]. In children, BP should be measured using a manual auscultatory device [32], or an electronic cuff device that has been specifically validated in children (see *Key Resources*). It is important that the cuff of the device fits the size of the child's mid-arm circumference. The classification of BPs is shown in Table 1.

Detection/diagnosis of hypertension and linkage to care in Africa

Detection/diagnosis of hypertension

Optimal detection of hypertension requires aggressive screening strategies in health care and non-health care

TABLE 1. Blood pressure classification based on office/clinic, home and ambulatory blood pressure measurements [17,50,51]

Category	Children* Age: 1–13 years	Adolescents Age: ≥13 years	Adults Age: ≥16 years
Office/clinic BP			
Normal	<90th percentile	<120 and 80 mmHg	As in the adults
Elevated	≥90th to <95th percentile or 120/80 mmHg to <95th percentile (whichever is lower)	120–129 and <80 mmHg	
Stage 1 hypertension	≥95th to <95th percentile + 12 mmHg, or 130–139 mmHg and/or 80–89 mmHg (whichever is lower)	130–139 and/or 80–89 mmHg	
Stage 2 hypertension	≥95th percentile + 12 mmHg, or ≥140 and/or 90 mmHg (whichever is lower)	≥140 and/or 90 mmHg	
Ambulatory BP			
Average 24-hour	≥95th percentile or adolescent cut points**	≥125 and/or 75 mmHg	As in the adults
Average Day (awake)		≥130 and/or 80 mmHg	
Average Night (asleep)		≥110 and/or 65 mmHg	
Home BP			
Average of at least 3 days (12 readings)	*Inconclusive evidence*	≥135 and/or ≥85 mmHg	

*Percentiles by age, sex and body height [19].
**Including 24-h, day (awake) and night (asleep) BP [52].

TABLE 2. Recommendations for screening for hypertension in sub-Saharan Africa

Healthcare facility-based (opportunistic) screening	Community health service screening	Community social centre screening
• BP checks for all patients attending healthcare centres regardless of reason for attendance and age • Wellness centres/clinics: dedicated walk-in screening services for patients' relatives and the public.	• Community health planning and services by nurses and volunteers • Community pharmacies and licensed chemical sellers • Laboratories centres • International awareness campaigns (e.g. World Hypertension Day and May Measurement Month and other screening programs) • Inclusion of children and adolescents	• Kiosk BP devices in public spaces (55) • Religious centres • Hair salons/ barbers • Community centres • Market places • Banks and other workplaces • Schools/colleges/universities • Social services

settings by health care workers and community workers, given that hypertension is asymptomatic until the development of target organ damage. Chandraratne *et al.* [53] showed that trained community youth could effectively conduct home visits within the community to check BP and ensure compliance with lifestyle changes. This role can be performed by community health workers as demonstrated in Western Kenya [54]. Three strategies can be employed for the detection of hypertension within the population or community (Table 2).

Sustainable community outreach should involve stakeholder engagements with the view to institutionalize routine BP screenings, providing health education and BP measurement during religious and native cultural activities and screening at static markets/shops as well as those with period market days [55].

Unique challenges

In high sickle-cell disease prevalence areas (e.g. West/ Central Africa), we recommend screening hypertensive patients for sickle-cell disease and related hemoglobinopathies. Notably, even modestly elevated BP ("relative hypertension") in these patients is associated with increased pulmonary hypertension and renal dysfunction (Box 2) [56,57].

Box 2 Health education and health-care services

- All BP screening initiatives for hypertension should include both preventive and therapeutic health education, including for those with normal BP readings.
- All clinical and community-based checks that reveal hypertension must link to health care services for appropriate evaluation and management.

Linkage to routine care or health system

Detected cases of hypertension in the communities should be triaged and have follow-up BP measurements with appointments at appropriate health facilities to confirm the diagnosis of hypertension. Hospital/clinic-based cases (through opportunistic screening) should be linked to the hypertension or general clinics for confirmation, evaluation and initiation of treatment. Community outreaches (to households, churches, mosques, markets, schools, companies, etc.) by health professionals and volunteers should have screening cards or electronic platforms for referral to health centres, clinics or hospitals for confirmations, evaluation and treatment. Community pharmacies, over-the-counter (OTC) medicine shops and laboratories should have screening cards or electronic platforms to link to the health systems (where applicable). Given the high burden of HIV in Africa, all HIV/ART clinics should incorporate cardiovascular (CV) risk and BP screening into routine care. Integration of hypertension care into HIV services is feasible: for example, at a large Ugandan HIV centre a WHO HEARTS-based strategy increased HTN control from 9% to 74% in 6 months without compromising ART outcomes [58]. A Ugandan study also showed that combining multi-month dispensing of ART and antihypertensives achieved sustained viral suppression and improved BP control [59]. These models support linking HTN management into HIV programmes (Box 3).

Box 3 Screening and tracking

All hypertension screening activities should collect relevant information, including social security/personal identification number, address and telephone, to aid tracking of detected cases of hypertension and send reminders to access health care services.

Blood pressure measuring technique

Blood pressure measurements

The appropriate BP measuring technique requires that a properly validated BP device and the right cuff size is used to fit the arm circumference of each individual [60]. For manual auscultatory devices, the appropriate inflatable bladder size covers at least two-thirds of the mid-upper arm circumference in Table 3[61]. For automated electronic devices, the manufacturer's instructions should be followed to select validated cuff sizes. Further to the recommended sitting position for BP measurement, among treated patients at high risk of orthostatic hypotension, for example old age, diabetics, CKD, etc., BP should be measured 1–2 min after standing from a sitting position.

Home blood pressure monitoring

HBPM and telemedicine are feasible for patients with access, though limited [62] in remote or rural areas. It involves self- or relative-assisted measurement using

Table 3. Selection of cuff size for manual auscultatory blood pressure devices

Bladder	Mid-upper arm circumference (cm) of the participant/patient					
Dimensions	12–15	15–18	18–23	23–28	28–35	33–42
Length, cm	12	15	18	23	28	33
Width, cm	6	7	9	12	14	16

Recommended inflatable cuff bladder sizes based on mid-upper arm circumference [59].
Adapted from Stergiou *et al*.[60].

validated automated upper-arm cuff devices [63] as described in Fig. 1. Wrist and cuffless technologies (e.g., smartphones, smartwatches) are inaccurate and should not be used. HBPM should be performed before office visits with duplicate morning and evening readings (duplicate readings twice daily) for 7 days, discarding the first day [63]. Fewer than 3 days (12 readings) are insufficient. Hypertension is diagnosed if the average systolic BP is ≥135 mmHg and/or diastolic ≥85 mmHg. HBPM is cheaper, more acceptable than ABPM, but lacks readings while at work or at night-time. In Africa, device use is limited and evidence in children is insufficient [15]. Children (<13 years) with hypertension should be referred to a paediatrician, and adolescents (>13 years) to an Internal/Family Medicine specialist. BP measurements at the community pharmacy and outreach by community nurses are encouraged to enhance out-of-office diagnosis and monitoring of hypertension.

Stepwise blood pressure measurement procedure [18,51,64]

1. Sit comfortably on a chair with the back supported, feet flat (and not crossed) on the ground in a quiet room with a comfortable temperature for 5 min.
2. Urinary bladder should be emptied, and no caffeinated drinks should have been ingested within 30 min before BP measurement.
3. Patient, caregivers and health worker should not be talking during and between the measurements
4. BP cuff should be positioned on the arm rested firmly on a table with the mid arm at the level of the heart.
5. Take 2–3 measurements, 1 min apart, and average the last two stable readings.
6. Validated electronic (oscillometric) upper-arm cuff devices should be preferred (updated lists at www.stridebp.org).

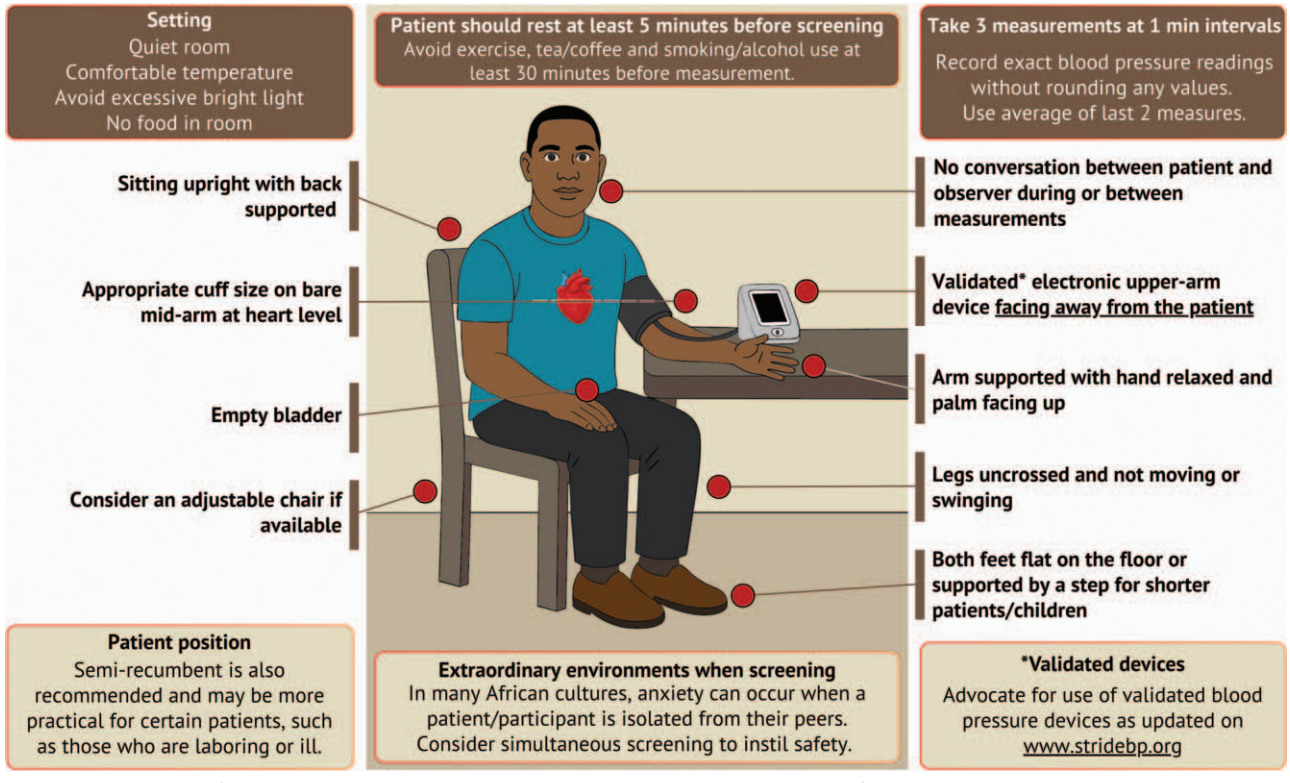

FIGURE 1 Standardized protocol for accurate blood pressure measurement in clinical and community settings. The figure illustrates optimal patient positioning, validated device use and environmental considerations, including pre-measurement rest, avoidance of stimulants and cultural sensitivity. Key steps include using an appropriately sized cuff at heart level, supporting the arm and feet, minimizing conversation and averaging the last two of three readings.

7. Good quality shock resistant manual auscultatory sphygmomanometers (e.g. aneroid or hybrid) can be used if validated electronic devices are not available or if electrical power sources are limited and should be preferred in patients with cardiac arrhythmias like atrial fibrillation [65].
8. Measure BPs in both arms on the first occasion and use the arm with higher BP for subsequent measurements [17]. If the inter-arm systolic BP difference exceeds 20 mmHg, further investigation for arterial stenosis is required.

Hypertension classification based on blood pressure monitoring

To support accurate diagnosis and appropriate management of hypertension across diverse African settings, especially where NPHWs play a pivotal role, this guideline introduces a simplified classification framework based on in-office and out-of-office BP monitoring. Table 4 outlines six distinct hypertension phenotypes, including sustained, white coat, masked, non-dipping, reverse dipping, and isolated systolic hypertension, each accompanied by actionable recommendations tailored for NPHWs [18,63,66]. We recommend the use of office BP for initial screening but confirm hypertension with home BP monitoring (HBPM) or 24-h ambulatory BP monitoring (ABPM) following international guidance when feasible. African feasibility studies (e.g. in Malawian HIV clinics) show ABPM identifies substantial white-coat and masked hypertension and abnormal nocturnal dipping [67]. Clinicians should interpret home/ABPM thresholds for hypertension per standard guidelines (e.g. daytime ABPM $\geq$135/85 mmHg). By translating complex diagnostic criteria into accessible decision pathways, this framework empowers NPHWs to identify high-risk individuals, initiate lifestyle interventions, and facilitate timely referrals, thereby strengthening decentralized cardiovascular care and improving population-level outcomes.

EVALUATION OF A PATIENT WITH HYPERTENSION

The evaluation of hypertension seeks to determine the:

1. Cause of hypertension (primary or secondary)
2. Stage and severity of hypertension
3. Presence of other CVD risk factors
4. Evidence of hypertension-mediated organ damage (HMOD), heart failure, coronary artery disease, stroke, etc.
5. Total CVD risk

Types of hypertension

Primary hypertension accounts for approximately 90% of cases. It has a polygenic basis with a complex interaction of environmental factors such as geographic location, lifestyle choices, socioeconomic status and sociocultural practices that influence diet, amount and frequency of physical activity, and levels of psycho-social stress.

Secondary hypertension has identifiable causes for hypertension, especially low renin hypertension which is more common in African populations (e.g. primary aldosteronism), CKD, renal artery stenosis are more often found in younger people or those with resistant hypertension. Secondary hypertension accounts for about 5–10% of adult cases.

Clinical evaluation

Evaluation begins with taking a clinical history and examination. Table 5 details the factors to be determined on history and examination.

Laboratory assessments and imaging tests are performed to confirm suspicions based on findings after clinical history and examination have been carried out. They assist in screening or confirming the presence of HMOD, evaluating overall cardiovascular risk and determining the presence of

TABLE 4. Blood pressure classification for non-physician health workers

Hypertension phenotype	BP pattern	Key features	Recommended action for NPHWs
Sustained hypertension	High BP in both clinic and out-of-clinic readings	Confirmed hypertension	Full evaluation and guideline-based treatment initiation
White coat hypertension	High BP in clinic, normal BP outside (home or ambulatory)	May be stress-related; risk of progression	Monitor periodically; promote lifestyle changes; refer if CVD risk is high
Masked hypertension	Normal BP in clinic, high BP outside (home or ambulatory)	Often missed; linked to higher CVD risk	Encourage home BP monitoring; initiate lifestyle changes; refer if CVD risk is high
Non-dipping pattern	Ambulatory nighttime BP drops <10% compared to daytime	Increased cardiovascular risk	Educate on sleep hygiene; refer for further CVD risk assessment
Reverse dipping pattern	Ambulatory nighttime BP higher than daytime	Strongly linked to sleep apnoea and CVD	Screen for sleep apnoea symptoms; refer for sleep study or specialist evaluation
Extreme dipping	Ambulatory nighttime BP drops >30% compared to daytime	Seen in older adults; linked to frailty, falls, and silent ischemia	Monitor for dizziness/falls; educate on hydration and nutrition; refer for cardiovascular evaluation
Isolated systolic hypertension	High systolic BP, normal diastolic BP (common in elderly)	Common in older adults; increases stroke risk	Prioritize lifestyle changes; refer for age-appropriate pharmacological management

CVD, cardiovascular disease; NPHWs, non-physician health workers.

TABLE 5. Noteworthy points in the history and examination of patients with hypertension

History	Examination
• Symptoms suggesting secondary causes of hypertension	• Weight, height and body mass index. *
• Symptoms of HMOD (breathlessness, blurred vision, chest pain, claudication, etc.)*	• Presence of oedema*
• Presence of non-modifiable risk factors*	• Tremors and tachycardia*
• Presence of modifiable risk factors*	• Presence of abdominal striae*
• Age at first diagnosis*	• Signs of dyslipidaemia (corneal arcus, xanthelasma)*
• BP control since diagnosis*	• Anterior neck mass
• Adherence to antihypertensive therapy and reasons for non-adherence*	• Presence of a carotid artery bruit
• Use of medications or substances that increase BP (nonsteroidal anti-inflammatory drugs, nasal decongestants, combined oral contraceptives, anticancer therapy, immunosuppressants, alternative therapies)*	• Position and character of the cardiac apex beat.
	• Presence of cardiac murmurs
	• Asymmetry of distal pulses
	• Urine dipstick for proteinuria and haematuria*
	• Fundoscopy (patients with stage 2 hypertension)
	• Renal mass and bruit

* Assessments NPHWs are expected to perform.

complications of treatment and evaluation for secondary hypertension (see Table 6).

Other risk factors

Other risk factors include co-morbid states or lifestyles that in synergy with hypertension, may accelerate the development of CVD, or worsen pre-existing disease. They may be modifiable (lifestyle factors) or non-modifiable, as seen in Table 7.

TABLE 6. Recommended investigations in evaluating hypertension

Essential investigations	Specialized investigations to consider based on risk, available expertise, logistics and history
• Urinalysis	• Serum lipid profile
• Fasting blood glucose	• Echocardiogram
• Electrocardiogram	• Chest X-ray
• Urinary dipstick for proteinuria	• Urine albumin/creatinine ratio
• Serum potassium, sodium	• Ultrasonography (aorta, kidneys, arteries)
• Serum creatinine	• Thyroid function tests
	• Plasma renin-aldosterone ratio
	• Urine/plasma metanephrines (in symptomatic people)
	• Dexamethasone suppression tests (only with clinical evidence)
	• Imaging tests (computed tomography scans)
	• Polysomnography (sleep studies)
	• Fundoscopy in cases with very high BP

Other newer risk factors include weight gain or loss in the past, erectile dysfunction, snoring or sleep apnoea, rheumatic disease, and long-term cancer survival [66]. Following assessment of risk factors in patients with hypertension, the patient's total CVD risk can be calculated and categorized using risk score calculators (see *Key Resources*).

Hypertension-mediated organ damage

This refers to changes in the structure and/or function of specific target organs because of sustained hypertension. Most notable among the affected organs are the heart, brain, kidneys, eyes, and peripheral arteries. The spectrum of organ damage is wide, ranging from asymptomatic disease

TABLE 7. Risk factors to be evaluated in patients with hypertension

Non-modifiable	Modifiable
• Age >55 years (men) or 65 years (women)	• Tobacco smoking
• Family history of premature CVD in first degree relatives (age <50 years)	• Alcohol abuse
	• Stimulant use or other agents that raise BP
	• Psychosocial stress
	• Obesity
	• Physical inactivity
	• High sodium intake
	• Low fruit and vegetable intake
	• Diabetes mellitus
	• Dyslipidaemia
	• Air pollution

CVD, cardiovascular disease.

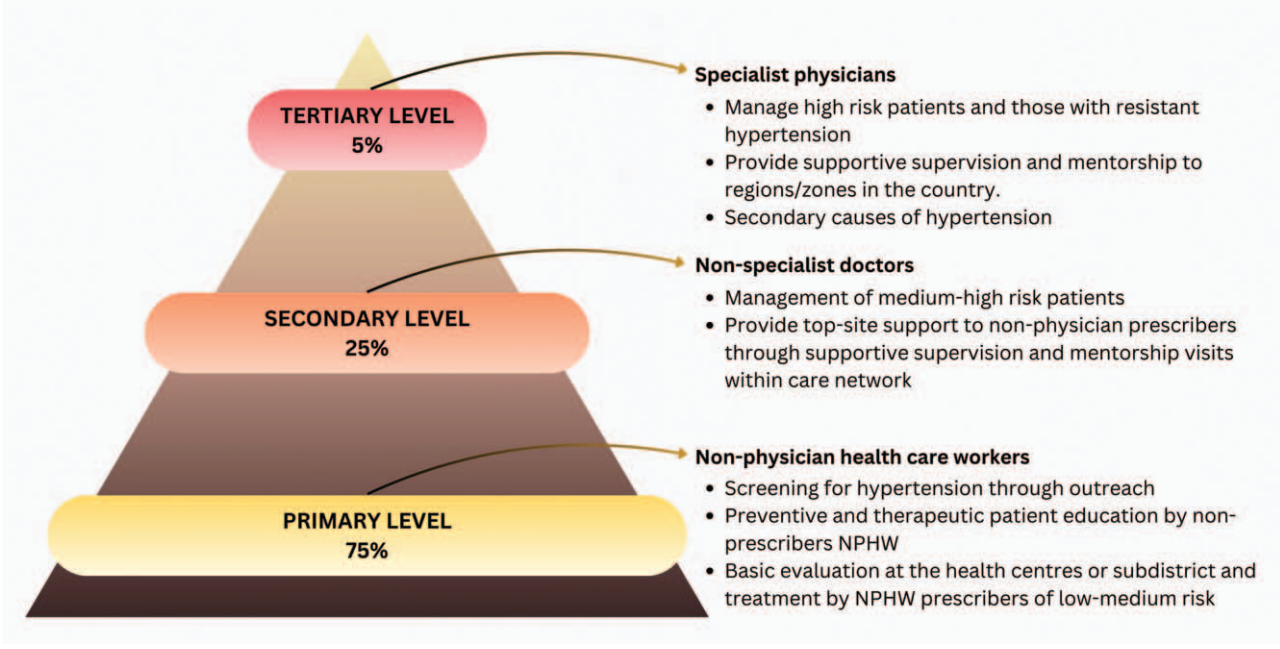

FIGURE 2 Recommendations for important roles of primary care facilities and NPHWs in managing hypertension in Africa.

to debilitating and life-threatening cardiovascular damage. The more severe stages impose serious disability, and ultimately result in recurring costs for families, communities, and nations, due to efforts in management and rehabilitation [2]. Due to limited resources in SSA, basic and essential investigations for HMOD (Table 5) are recommended.

MANAGEMENT OF HYPERTENSION IN AFRICA

The management of hypertension is non-pharmacological and pharmacological. Office BP targets for low-risk hypertension are systolic <140 mmHg and diastolic <90 mmHg. Medium and high-risk hypertension as determined by the World Health Organization (WHO)/ISH risk prediction heat-map charts (see *Key Resources*), require BP reduction to <130 mmHg systolic and 80 mmHg diastolic. Care should however be taken in older people, who are at a higher risk of falls due to orthostatic hypotension.

NPHWs at the primary care level such as non-physician prescribers (physician assistants and nurse prescribers) and non-prescribers (nurses, pharmacist and laboratory technicians) should be empowered to detect, evaluate and manage hypertension within the health systems of Africa (Fig. 2) [68,69]. Local healthcare networks must ensure that a structured chain of supervision and referral is designed and implemented at the local level to support safe prescribing and referral practices [38,54]. This includes formal oversight by a designated physician or clinical supervisor, who regularly reviews prescriptions, provides case-based guidance, and is accessible for consultation and escalation of complex cases. Such a mechanism ensures that non-physician prescribers operate within a defined scope of practice and that hypertension care remains safe, effective, and accessible to all Africans at the primary care level.

Lifestyle and behavioural changes

These involve measures to lower BP by instituting evidence-based lifestyle and behavioural changes (Table 8) [70]. It is the cornerstone of hypertension therapy and must be initiated in all patients, before and together with drug therapy. These interventions are discussed below.

General recommendations[71]

1. Cardiovascular health preservation and primordial prevention
2. Health education in schools, especially in primary schools
3. Lifestyle modifications even when BP is normal
4. Healthy weight, increased physical activity and healthy eating and drinking
5. Cessation of smoking

Sodium reduction[71]

1. Limit sodium intake to approximately 2 g per day (i.e., 1 level teaspoon of salt).
2. If using salt, consider the use of potassium-enriched salt.
3. Be cautious of other sources of high sodium levels, including meat/fish preserved by salting, bouillon cubes, canned/processed foods, salty snacks and salt-based spices seasonings used for grilled meat and other delicacies.

Diet (general)

1. Dietary changes facilitate weight loss and supply nutrients beneficial for BP reduction and improved overall health.
2. Increase the intake of fruits and vegetables (daily intake).

TABLE 8. Lifestyle Interventions for lowering blood pressure [70]

Intervention	BP lowering effect (mmHg)	Preferred	Limit/prevent	Alternatives/substitutes
Salt	5–6	≤2g/day	Salted foods	Natural spices/ herbs/ lemon
Diet	8–14	Vegetables/fruits	High calorie and salt diet	Green vegetables, fruits, hibiscus
Alcohol	4–5.5	Abstain from alcohol intake	Beer, wine and spirits intake, including local alcohol	Alcohol free beverages
Stress	Variable	Mindfulness and coping mechanisms	High stress situations	Social support structure
Weight	1/kg	BMI 20–25 kg/m^2	Overweight/obesity	Active weight
Exercise	5–8	30 min/5 days/week	Sedentary lifestyle	Activity at work

3. Increased intake of fish and other seafood, especially oily fish like tilapia, and chicken.
4. Prioritize unprocessed grains like oats, wheat, unpolished/minimally polished rice, millet, etc., as opposed to processed foods.
5. Eat red meat sparingly.
6. Maintain adequate hydration.
7. Practice healthy intermittent fasting.

Diet (including specific African foods with suggested BP lowering benefits)

1. Dark chocolate or raw cocoa (without sugar).
2. Unsweetened yogurt (e.g., wara, mgando, lyogathi)
3. Hibiscus tea (bissap, wonjo, florere, dabileni, tsobo, zobo, sobolo)
4. Vegetables: bitter leaf, water leaf, spinach (e.g., mchicha, efo tete, kontomire, isipinashi, etc.), African eggplant, okro, beetroot, etc.
5. Fruits: Berries, pomegranates, citrus fruits (including orange), banana, tomatoes, avocado, etc.

African diets to avoid or take in moderation

1. salted fish, stock/broth cubes
2. salted nuts/popcorn/chips,
3. oil fried snacks (e.g. fried plantain, yam, potatoes, etc.),
4. condensed milk, etc.

Physical activity

1. People should aim to exercise 150 min/week for moderate intensity (e.g. brisk walking, swimming, dancing, riding a bicycle, gardening, skipping) and 75 min/week for high intensity (e.g. jogging/running, playing football, weightlifting).
2. All forms of exercise are better than no exercise.
3. Maintain activity throughout the day.
4. Office workers with long sedentary working hours should take regular walk breaks.

Weight loss (if overweight or obese)

1. Achieved by regular exercise, dietary changes and moderating food portions (i.e., food portions consumed should be proportionate to the expected level of activity afterward).
2. Maintenance of appropriate weight.

African considerations in lifestyle management

Non-pharmacological management, to be effective, requires a multidisciplinary team [17]. This is especially important considering the prescriber–patient ratio, which limits the amount of quality time spent with the patient.

Few African hospitals practice strict hospital appointment systems, which results in a general pool of patients waiting for long periods together until it is their turn for a consultation [72]. These wait times present an untapped opportunity for group health education on lifestyle changes, adherence to therapy, complications, and myths surrounding hypertension by trained nurses and/volunteers. Hypertension messages can be broadcast on television screens in outpatient waiting areas and educational flyers may be distributed. This seeks to give some initial education that will be reinforced during the medical consultation. Health education resources must be culturally appropriate, ensuring that it is presented in a manner that is acceptable to the population.

The role of diet in hypertension management is established, as evidenced by the recommendation of Mediterranean-type diet or the Dietary Approaches to Stop Hypertension (DASH) diet [17,70,73]. These however are dependent on foods available in Western countries, which come at a high cost in Africa due to importation. Dieticians are required to help patients substitute these dietary requirements in the context of their local staples and spices. These foods vary across the continent, so this is to be achieved on a country-by-country basis, with the same guiding principles.

Psychosocial stress is an important driver of hypertension [70,74–76], especially among the younger working population and those exposed to adverse childhood experiences. It may be prudent to include a psychosocial assessment as part of care in attending to patients. This can either be by using a validated tool such as the Depression, Anxiety, Stress Scale – 21 items (DASS-21), Patient Health Questionnaire-4 (PHQ-4), etc., or asking questions that screen for anxiety, depression, and stress. Those found to have significant psychosocial disturbances may be referred to see a psychologist/psychiatrist, psychology nurse or social worker (Box 4).

Box 4 Streamlining care and strengthening patient empowerment in African clinics

- Patients in Africa wait for long hours before being attended to by a prescriber (doctor or NPHW), while the clinical consultation lasts for just a few minutes.
- Non-prescriber NPHW (nurses and pharmacists) should be tasked to provide patient empowerment information (self-care, preventive and therapeutic lifestyle changes as well as education on hypertension and its management, including potential adverse effects of medications).

Pharmacological therapy

General considerations and choice in the pharmacological management of hypertension are summarized in Fig. 3. This should be considered for all hypertensive adults who are moderate or high risk at diagnosis (see section for *Categorization*, and *Key Resources*), in conjunction with lifestyle interventions. Some pharmacological options are listed in Table 9. Low risk patients can have a trial of non-pharmacological methods and be re-assessed after a few months (e.g., up to 6 months) to reassess the need for pharmacological therapy.

Hypertension management in Africa should prioritize long-acting dihydropyridine calcium channel blockers (CCB), thiazide or thiazide-like diuretics (D), and angiotensin-converting enzyme inhibitors (ACEi) or angiotensin receptor blockers (ARB) as first-line agents. Where feasible, initiation with single-pill dual or triple combinations is recommended, especially in patients $\geq$20/10 mmHg above target. Most patients will require dual therapy, and early initiation improves blood pressure control and prognosis, as reflected in local guidelines and supported by the VERONICA trial [34]. Safety considerations include avoiding ACEi/ARB in pregnancy and not combining ACEi with ARB. NPHWs should be enabled to prescribe CCBs and diuretics; and where permitted any of the three classes under supervision. If monotherapy is chosen, the BP response should be reassessed after one month before adding a second agent. Digital health tools can strengthen prescribing, monitoring, and adherence while safeguarding vulnerable groups (Box 5).

Box 5 Foundational or first line drugs for hypertension management in Africa

- Calcium channel blocker (CCB) (long-acting dihydropyridines)
- Thiazide/thiazide-like diuretics (D)
- Angiotensin converting enzyme inhibitors (ACEi) OR angiotensin receptor blockers (ARB)

Ideally as single-pill, 2 or 3-drug combination (CCB $\pm$ D $\pm$ ACEi/ARB) where available and affordable, above 20/10 mmHg of the desired BP.

Non-physician (NPHW) prescribers can give CCB and diuretics. ACEi/ARB (not simultaneously or in pregnancy) can be given in consultation or under the supervision of a doctor.

Compelling indications for specific antihypertensive classes

There are specific health conditions, either as predisposing factors to or complications of hypertension, which require the use of specific classes of anti-hypertensive therapy to reduce patient morbidity and mortality. These are shown in Fig. 4.

Despite compelling indications however, attending healthcare workers may need to exercise discretion based on availability and affordability of various groups of anti-hypertensive medication where the guideline-recommended drugs are unavailable. This decision should be taken on a case-by-case basis with respect to local drug availability, and the primary goal of antihypertensive treatment which is to reduce BP (Box 6).

Box 6 Anti-hypertensive therapy administered by NPHWs

The choice of anti-hypertensive therapy to be administered by NPHWs must be guided by local policies on the permitted scope of practice. The recommendations in this guideline do not override local recommendations.

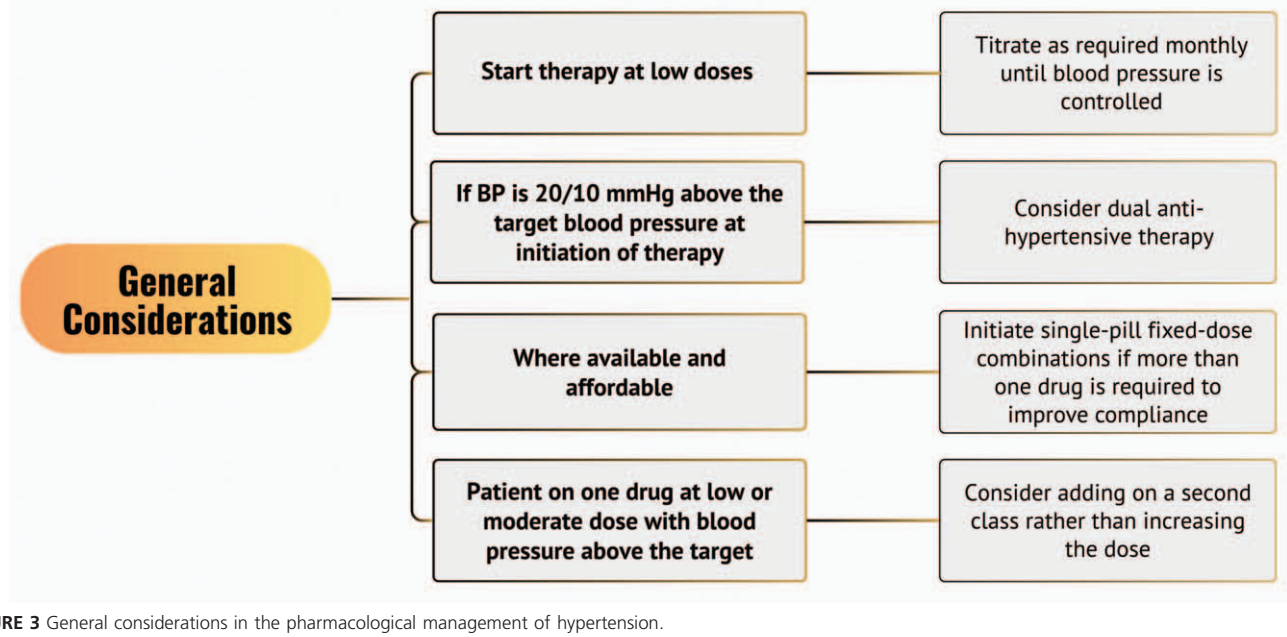

FIGURE 3 General considerations in the pharmacological management of hypertension.

TABLE 9. Common anti-hypertensive drug classes and recommended doses for all cadres of health workers

Drug class	Drug name	Starting Dose (mg daily)	Full dose (mg daily)	Main side effects	Contra-indication
Dihydropyridine Calcium channel blockers*	Amlodipine	2.5	10	Ankle swelling, headaches, flushing, rebound tachycardia (more with short-acting nifedipine)	Severe aortic stenosis
	Felodipine	5	10–20		
	Nifedipine (long acting)	30	90		
Thiazide-like/ thiazide diuretics*	Indapamide	1.25	2.5	Hyperuricaemia, blood sugar, triglycerides increase, hypokalaemia/ natremia, sexual dysfunction	Gout, hypokalaemia, hyponatremia, severe dehydration, anuria
	Chlorthalidone	12.5	25		
	Hydrochlorothiazide	12.5	25		
	Bendroflumethiazide	2.5	5		
Angiotensin converting enzyme (ACE) inhibitors	Lisinopril	10	30–40	Dry cough, Angioedema, rise in creatinine, hyperkalaemia	Pregnancy, angioedema history, bilateral renal artery stenosis and single kidney
	Ramipril	2.5	10–20		
	Perindopril	5	10		
Angiotensin receptor blockers (ARBs)	Candesartan	8	32	Rise in creatinine, hyperkalaemia	Pregnancy, angioedema, bilateral renal artery stenosis and single kidney
	Valsartan	80	320		
Mineralocorticoid receptor antagonists (MRAs)	Spironolactone	12.5	50	Hyperkalaemia. Spironolactone causes painful gynaecomastia, impotence	Hyperkalaemia, severe renal impairment, hypotension
	Eplerenone	25 (twice daily)	100 (twice daily)		
Beta blockers	Carvedilol	3.125 (twice daily)	25 (twice daily)	Worsening of asthma, worsening acute pulmonary oedema, bradycardia, erectile dysfunction	Cardiogenic shock, severe bradycardia, hypotension, acute decompensated heart failure and high degree AV-block (Mobitz II and complete AV block)
	Bisoprolol	2.5	10		
	Metoprolol succinate	25	200		
	Nebivolol	2.5	10		
	Labetalol (commonly used in pregnancy)	100 (twice daily)	1200 (twice daily)		
Centrally acting antiadrenergic	Methyldopa	250 twice/thrice daily	1000 thrice daily	Headaches, dizziness, depression, low libido, dry mouth	Active liver disease, phaeochromocytoma
Vasodilators	Hydralazine	10 twice/thrice daily	50 thrice daily	Headaches, dizziness, profound hypotension, drug-induced lupus, reflex tachycardia, fluid retention.	Obstructive coronary artery disease and severe valvular stenosis
Alpha-1 receptor blockers	Doxazosin	1	16	Dizziness, daytime somnolence, profound hypotension	Orthostatic hypotension, congestive cardiac failure
	Prazosin	1 twice daily	10 twice daily		

* Preferred first line drug classes.

Management of hypertension based on staff expertise

Upfront dual antihypertensive therapy is increasingly recommended due to its ability to target multiple pathophysiological mechanisms simultaneously such as volume overload, vascular resistance, and neurohormonal activation, thereby achieving faster and more effective blood pressure control. This approach improves early response and long-term outcomes, especially in patients presenting ≥20/10 mmHg above target (Fig. 5). However, monotherapy remains appropriate in select cases, including individuals with high-normal BP (120/70–139/89 mmHg), advanced age (≥85 years), limited life expectancy, frailty, or symptomatic postural hypotension, where a cautious, individualized strategy is warranted to avoid overtreatment and adverse effects [77,78]. High-risk hypertension should be managed stepwise across primary, secondary, and tertiary levels of care, with referral to a specialist physician when resistant hypertension is suspected or confirmed (Fig. 6).

Blood pressure monitoring while on treatment

HBPM is recommended to assist hypertension diagnosis and long-term management, if available. This practice will improve the accuracy of BP evaluation and patient adherence with long-term drug treatment and can reduce the burden in clinics (Box 7).

Box 7 BP monitoring in the hypertensive patient

- Patients with hypertension who cannot afford the automated home BP monitors, should leverage routine home visits by community health nurses for HBPM, visit the community pharmacies or pharmacy shops for BP monitoring in the communities, or have their BP measured by kiosk BP devices in public spaces, wherever available
- Considering the distance between communities and health centres or clinics with NPHW prescriber or doctors or specialists, as well as queues in outpatient clinics, it is recommended that a community monitoring policy be employed in managing patients with hypertension who are controlled. This allows patients

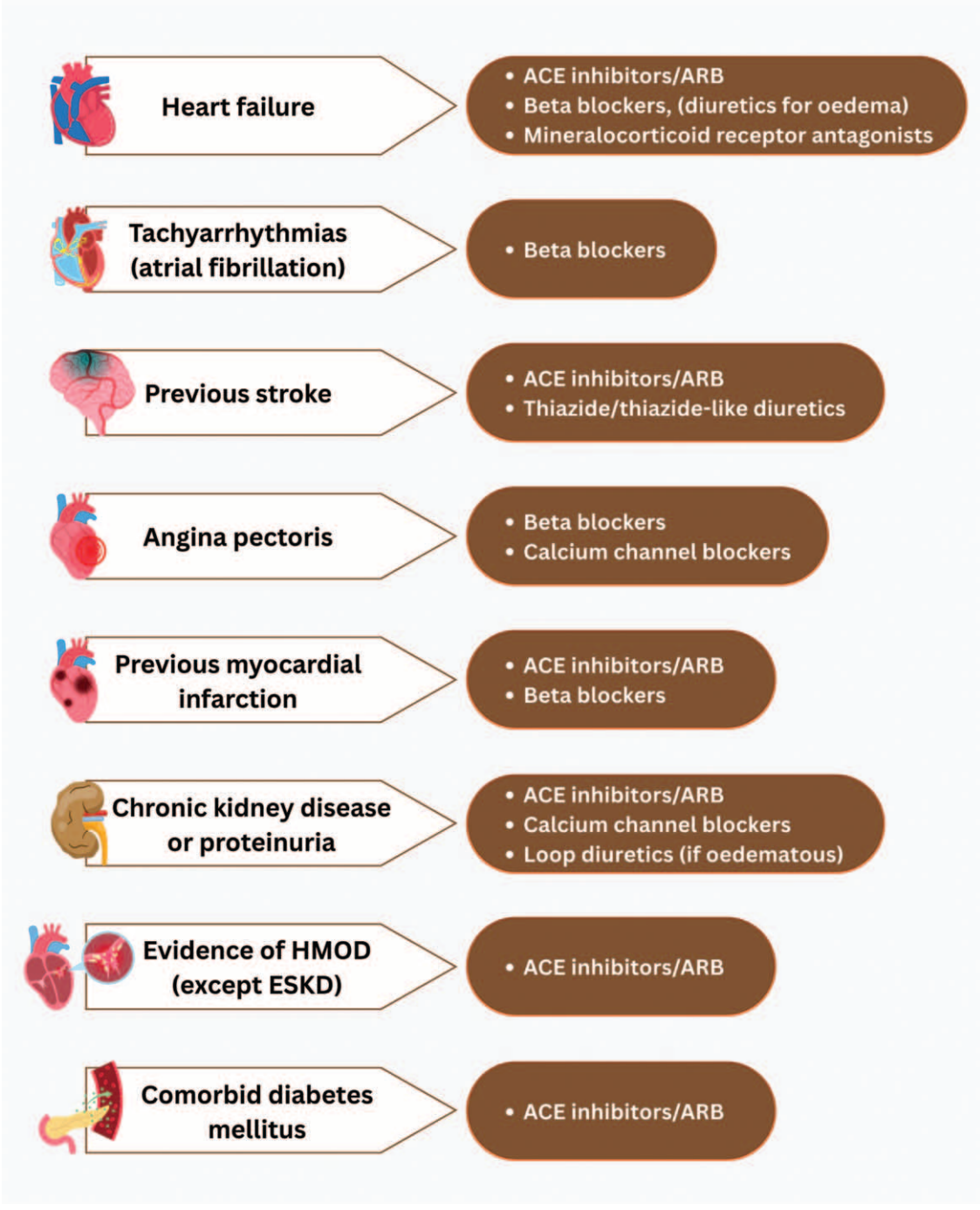

FIGURE 4 Compelling indications for specific anti-hypertensive drugs in the absence of contraindications.

to visit community centres like wellness clinics and community health services at scheduled times, where trained NPHWs can measure BPs and reinforce educational information to patients. Medications may be refilled by these NPHWs to ensure sustained control, and selected patients can be referred when necessary. NPHWs should be trained to identify signs of HMOD to allow for earlier referral as necessary while monitoring at the community level.

Hypertension self-care

Patients are important stakeholders in the care process, and adherence is determined by complex interactions between their beliefs and willingness to take medications. Ensuring adherence to prescribed treatments, both pharmacological and lifestyle, requires that patients be educated to have a shared understanding of the diagnosis and treatment plan [79–81]. Patients should be made aware of the risks associated with high BP, the importance of achieving and maintaining good control to reduce these risks, and their individual target BP levels. They should be empowered to monitor their own BP at home using the proper technique, at pharmacies, or other accessible facilities, and be

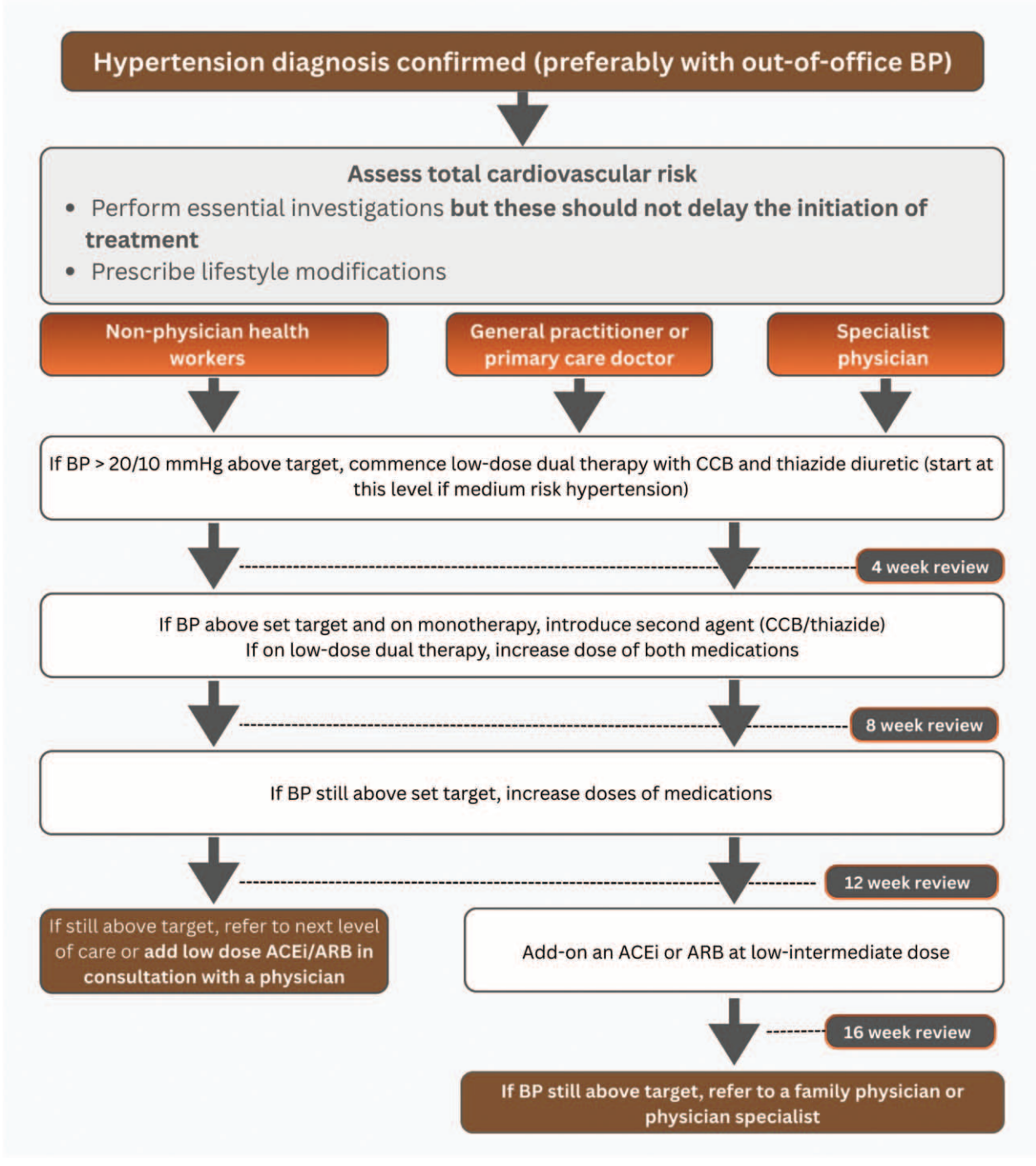

FIGURE 5 Management of low- and moderate-risk hypertension at various levels of care.

guided on the appropriate steps to take when readings are high or low. To strengthen this understanding, different contextual strategies should be employed to raise community awareness, including the use of health mobilizers and educators, as well as information, education, and communication materials tailored to local settings and cultural realities. Importantly, this education must be repeated regularly to improve rates of retention [82].

RESISTANT HYPERTENSION

Resistant hypertension is defined as blood pressure ≥140/90 mmHg despite adherence to lifestyle measures and maximal doses of three agents, i.e., calcium channel blocker (CCB), thiazide/thiazide-like diuretic, and either an ACEi or ARB [78]. Diagnosis requires confirmation with out-of-office measurements (HBPM or ABPM) to exclude pseudo-

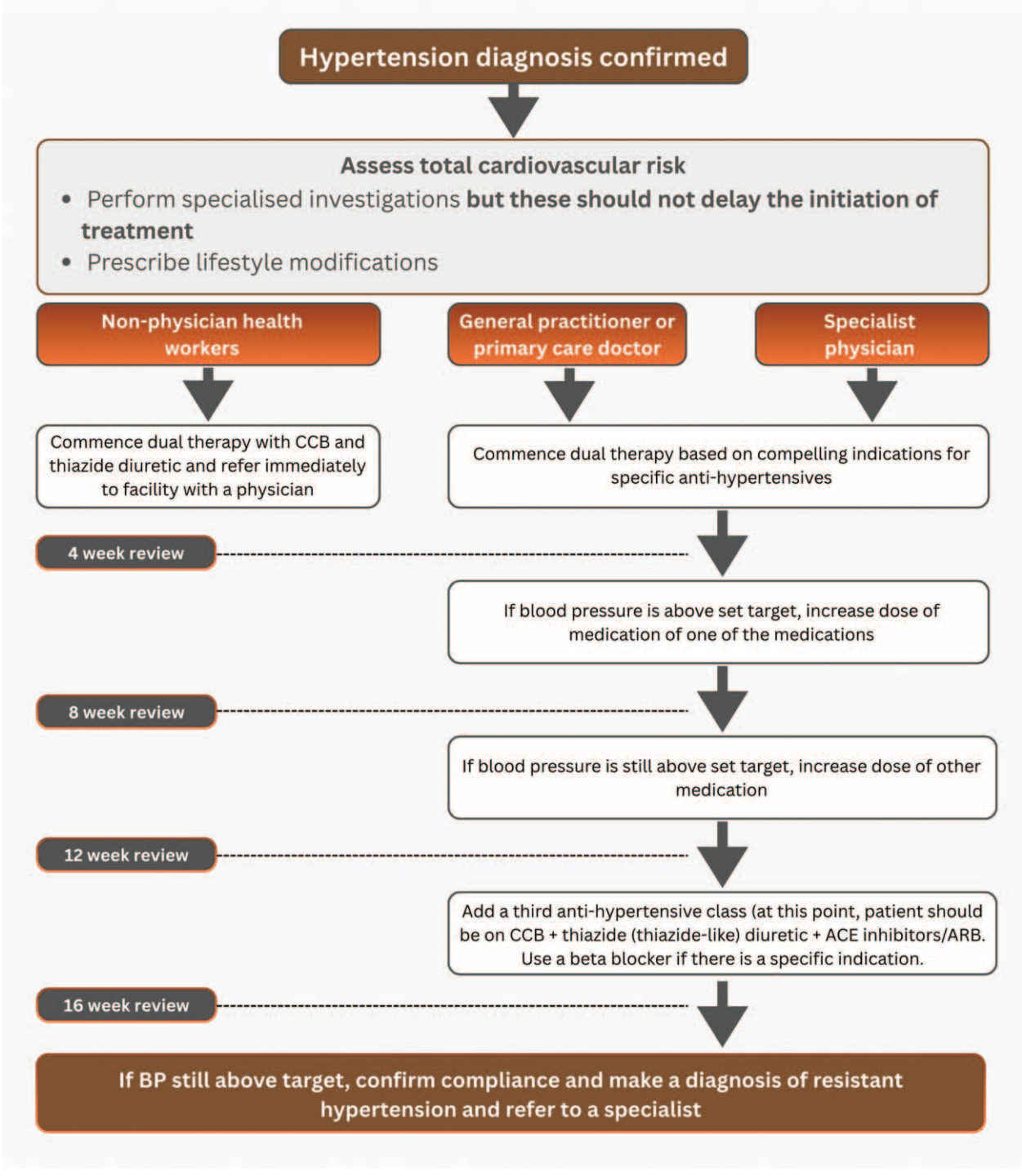

FIGURE 6 Management of high-risk hypertension at various levels of care.

resistance and white coat hypertension. Patients should be assessed by a qualified hypertension specialist, with careful evaluation of adherence to both pharmacological therapy and lifestyle changes, particularly salt reduction given the high prevalence of salt sensitivity in Black African populations. It is also essential to verify correct medication use, dosing and blood pressure measurement technique, including appropriate cuff size.

The approach to resistant hypertension seeks to determine the cause of resistance, if any, and optimize BP management to avoid the development of HMOD. To achieve this, the treating clinician needs to review clinical history with an increased suspicion for secondary hypertension especially primary aldosteronism (see Table 4) and drugs that may increase BP. Psychosocial stress that may be contributing to the high BPs need to be identified.

Treatment of resistant hypertension requires the addition of appropriate add on antihypertensive therapy, based on evidence of HMOD and secondary causes. The preferred drugs to add on are spironolactone and minoxidil, unless a cause is identified which requires that another specific drug be prioritized (e.g., phaeochromocytoma will require alpha and then beta blockade).

Patients with resistant hypertension are usually at high risk and require close monitoring to ensure that medical interventions are improving BP control. Such patients also require frequent reinforcement of education on the non-pharmacological management of hypertension. When available, specialist care should be made available to these patients. However, non-specialists may be required to take care for these patients and NPHWs are vital at the community level to ensure compliance with therapy and progress. Linkage with community welfare clinics and community health services, as well as HBPM, is recommended for such patients. This practice will contribute to improved outcomes and allows for early intervention, where necessary.

SECONDARY CAUSES OF HYPERTENSION

This refers to hypertension that occurs due to another disease process. It is commoner in cases of resistant hypertension. A diagnosis of secondary hypertension should be considered in patients with:

1. True resistant hypertension.
2. Recent worsening hypertension despite adherence to therapy.
3. CKD that does not predate the diagnosis of hypertension.
4. History of alcohol abuse or substances that increase BP.
5. Clinical features or diagnosis of endocrine disorders, such as hyperthyroidism and adrenal gland disorders.
6. Hypertension and hypokalaemia.
7. New onset hypertension in the elderly, especially diastolic.
8. Possibly those aged under 30 years without family history of hypertension (parents).

The selection of cases with high probability of secondary hypertension is not straightforward and the investigation is complex and expensive. Treatment is dependent on the cause and is often difficult to control. Once a possible diagnosis of secondary hypertension is considered,

1. The patient must be referred to receive specialist level care.
2. Clinical history and assessment must be deliberate to identify the potential secondary cause(s) (see Table 4).
3. Specialized tests must be requested as appropriate to aid in diagnosis, guided by the history (Table 5).

HYPERTENSIVE URGENCY AND EMERGENCY

Hypertensive urgency

This refers to systolic BP >180 mmHg and/or diastolic >110 mmHg, in the absence of acute symptoms of target organ damage. Although the definition of hypertension requires BP measurements on repeated visits, recording BP on a single occasion in this range with evidence of HMOD is sufficient to diagnose hypertension and initiate therapy. Otherwise, repeat evaluation within the next few days is necessary (office and out-of-office BP if available) to confirm the true BP level and avoid overestimation that is very common in the initial office measurements (Fig. 7).

Hypertensive urgency is managed as high-risk hypertension and it is recommended that they are given short clinic reviews, that is, 1–2 weeks for the first visit post-initiation of therapy. This allows for quicker BP optimization to reduce the risk of progressing to develop HMOD.

A diagnosis of hypertensive urgency does not warrant admission for inpatient management, nor is it indicated to initiate parenteral antihypertensive therapy. These patients are managed as outpatients but may be kept for close monitoring temporarily on a case-by-case basis to ensure appropriate monitoring of BP after initiation of oral antihypertensive medications, in accordance with local health policy regulations.

Hypertensive emergency

Hypertensive emergency refers to an acute rise in BP accompanied by evidence of acute target organ injury. While BP levels often reach stage 2 hypertension thresholds, such emergencies may occur at lower pressures depending on the patient's baseline BP, particularly in conditions like severe pre-eclampsia or nephritic syndrome. Failure to promptly lower BP can result in irreversible organ damage, increased morbidity, and mortality. There are various types of hypertensive emergencies, each defined by the organ system involved and associated BP-lowering goals. Common presentations are listed in Table 10. Accelerated or malignant hypertension is a distinct entity, characterized by BP typically above 180/120 mmHg and bilateral grade i.v. hypertensive retinopathy, often with concurrent organ damage.

Urgent baseline investigations for all hypertensive emergencies include:

1. Full blood count (haemoglobin, platelet count, red cell distribution width)
2. Electrocardiogram (ECG)
3. Blood urea, electrolytes, and creatinine
4. Urinalysis
5. Liver function tests (alanine and aspartate aminotransferase levels, bilirubin)
6. Clotting profile
7. Fundoscopy

Management requires hospitalization and intravenous antihypertensive therapy using agents such as labetalol, nitroglycerine, nitroprusside, metoprolol, or hydralazine. Rapid BP reduction with sublingual nifedipine, nitrates, or captopril is contraindicated due to the risk of precipitating ischemic events. Once stabilized, patients should transition to routine hypertension care.

In primary care settings where physician expertise is unavailable, NPHWs should initiate immediate stabilizing

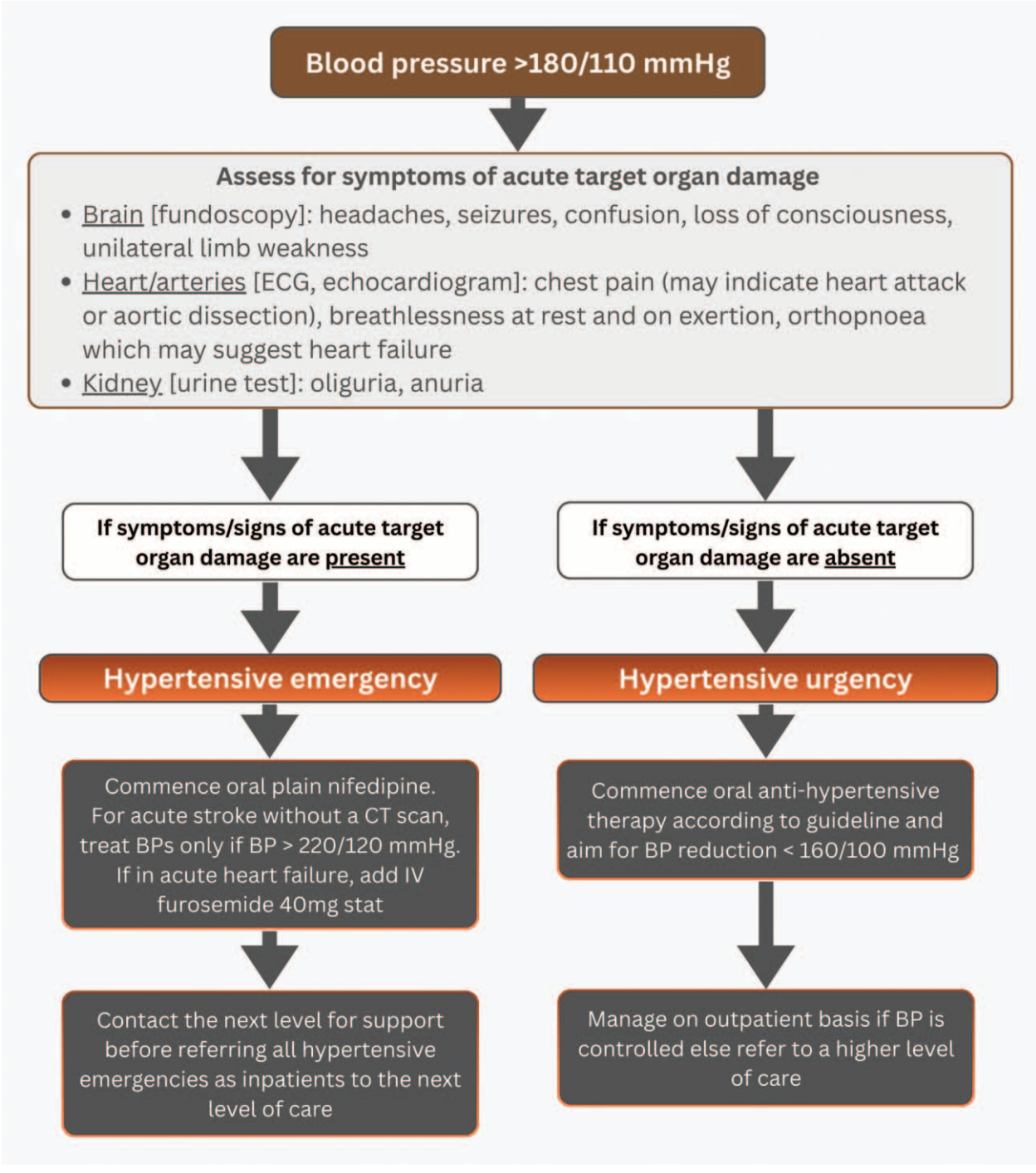

FIGURE 7 Management of very high BP in a fully conscious patient by non-physician health workers in Africa.

measures and arrange urgent referral (Fig. 8). This may include passing a nasogastric (NG) tube and administering a crushed CCB as initial therapy during transport. The goal is to institute safe first-line intervention and expedite transfer to a facility equipped for advanced management.

HYPERTENSION IN SPECIAL CONDITIONS

Despite the general recommendations for the management of hypertension, there are certain populations that require specific approaches to management. These people have unique factors that influence the efficacy and appropriateness of certain antihypertensive drug classes.

Hypertension in pregnancy

Hypertensive disorders in pregnancy are common in Africa, with a 50% pooled prevalence of gestational hypertension, 44% for pre-eclampsia and 14.7% for eclampsia from 1996 to 2017 [22]. They are the second leading cause of maternal and foetal morbidity and mortality. They have a strong correlation with the long-term risk of early onset

TABLE 10. Common hypertensive emergencies

Organ	Emergency	Symptoms	Specific investigations	Treatment goal
Brain	Encephalopathy	Headaches, seizures, blurred vision, altered consciousness, aggression	Fundoscopy, computed tomography (CT) scan / magnetic resonance imaging (MRI) of the brain	Reduce mean arterial pressure (MAP) by 20–25% over 4 hours
	Acute intracranial bleed (haemorrhagic stroke, subarachnoid haemorrhage)	Headaches, limb weakness, personality changes, seizures, altered consciousness	Non-contrast CT scan of the brain	Reduce BP to below 140/90 mmHg within up 4–24 h
	Acute ischemic stroke with BP >220/120 mmHg	Lateral limb weakness or paralysis, aphasia, seizures, altered consciousness	Non-contrast CT scan of the brain	Reduce MAP by up to 20% over 24 hours, avoid excessive BP reduction
Heart and major arteries	Acute left ventricular failure	Acute breathlessness, orthopnoea, easy fatigue, paroxysmal nocturnal dyspnoea, cough	Chest X-ray, NT-BNP, echocardiography	Reduce BP to below 140/90 mmHg over 4–24 h
	Acute coronary syndrome	Acute chest pain, diaphoresis, vomiting, epigastric discomfort	Electrocardiogram, cardiac enzymes (highly-sensitive troponin T preferably), echocardiography	Reduce BP to below 140/90 mmHg over 4–24 h
	Aortic dissection	Acute "tearing" chest pain radiating to the back, diaphoresis, dizziness, shock	Chest X-ray, echocardiogram, CT chest +/- abdominal angiogram (aortogram)	Reduce BP to below 120/80 mmHg, and pulse to below 60 BP within 4 hrs
Placenta	Pregnancy with pre-eclampsia/eclampsia	Abdominal pain, headaches, vomiting, seizures, reduced foetal movements	Urinalysis, bedside clotting test, obstetric scan, cardiotocography (CTG)	Reduce BP below 160/110 mmHg immediately
Brain and kidney	Malignant hypertension	Oliguria and anasarca (acute kidney injury), blurred vision and "floaters" (retinopathy), symptoms of encephalopathy, petechiae/ecchymosis	Fundoscopy, blood urea, electrolytes and creatinine, CT/MRI scan of the brain, FBC (haemoglobin and platelets to check for thrombotic microangiopathy)	Reduce MAP (MAP) by 20–25% over 4–24 h

cardiovascular and kidney disease [83]. Hypertensive disorders in pregnancy can be complicated by acute kidney injury, liver damage, haematological abnormalities, placental abruption, seizures, intrauterine foetal growth restriction and stillbirth. Pre-eclampsia (hypertension in pregnancy with accompanying organ damage) leads to increased rates of foetal and maternal morbidity and mortality [84,85]. Long-term complications include venous thromboembolism, coronary artery disease, cardiac arrhythmias, stroke and kidney disease.

All pregnant women should be closely monitored for possible BP elevation and development of proteinuria. In pregnancy, BP should be measured using a manual auscultatory device or an electronic cuff device which has been specifically validated in pregnancy and preeclampsia. Hypertensive disorders of pregnancy are classified according to pre-existing hypertension, onset of hypertension in pregnancy and presence of organ damage [86]. All pregnant women, regardless of age, pregnancy status, presence of comorbidities or complications need to be risk stratified. Mandatory investigations should be performed as in Table 5. Non-pharmacological interventions should be instituted. Obstetricians and midwives should be encouraged to measure BP at each antenatal visit. Pregnant women with elevated BPs should be encouraged to self-monitor BP at home (Box 8).

Box 8 Hypertension in pregnancy

Hypertension in pregnancy may persist following delivery and is associated with early onset HMOD. All women who have had hypertension in pregnancy require long-term follow-up to detect hypertension and prevent the development of HMOD. Annual follow up should be performed and include BP, clinical examination, urine dipstick, and creatinine.

Management of hypertension in pregnancy

The approach (Fig. 9) to the management of hypertensive diseases in pregnancy differs from management in the general population in some respects.

For pharmacological management, refer to Table 9 for dosing information. Long-acting nifedipine, oral labetalol and methyldopa are preferred as first-line medication options. Oral antihypertensives may need to be administered if BP is 140/90 mmHg or more, however if BP rises to or above 160/110 mmHg then admission to hospital could be necessary as parenteral antihypertensive treatment may need to be given as seen in Table 11 below. RAAS inhibitors should not be prescribed during pregnancy, as they may cause foetal renal dysfunction, oligohydramnios, and adverse developmental outcomes. Similarly, they should not be prescribed for women who are planning to get pregnant imminently.

Pregnant women with higher risk of developing pre-eclampsia such as those with one major risk factor or two moderate risk factors (see Table 12), should receive low dose aspirin 75–150 mg from 12 weeks of gestation onwards as this reduces their risk of developing preeclampsia [87,88].

Women with a history of hypertensive disorders during pregnancy are at increased risk of subsequent hypertension and cardiovascular disease and require close follow up in the post-partum period and referred to a specialist [89]. These women are at increased risk of future chronic hypertension, kidney and cardiovascular disease [90]. The relative risk of chronic hypertension is highest in the first 6 months following delivery, motivating regular screening in these women. The BP measurements, urine analyses and cardiovascular disease risk assessment, should be performed at 6–

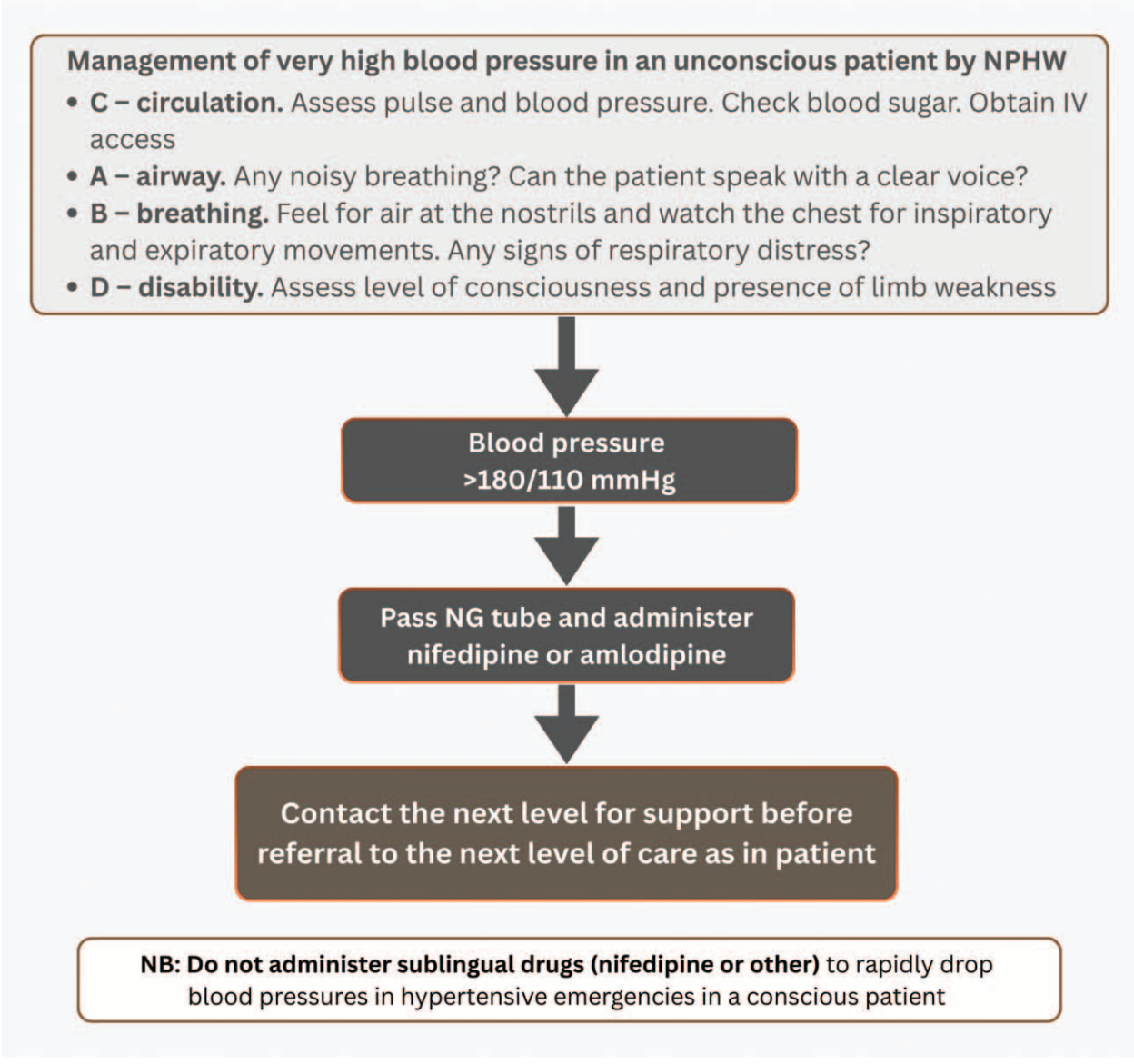

FIGURE 8 Management of very high blood pressure in an unconscious or confused patient by non-physician health workers.

12 weeks at least, then at 6- and 12-months post-partum and annually subsequently (Box 9) [91].

Box 9 General recommendations in pregnancy

- Where possible, cases of hypertension in pregnancy should be co-managed by the Obstetrician-Gynaecologist and the Internal Medicine/Family Medicine Specialist or co-managed with a physician with expertise in managing hypertension in pregnancy
- If such specialists are unavailable, women should be managed in units experienced in the management of pregnant women with hypertension.
- Include hypertension risk stratification in classifying pregnancy risk and scheduling frequency of antenatal visits.
- All women with hypertension planning a pregnancy should ideally visit an Obstetrician-Gynaecologist and/or an Internal Medicine/Family Medicine Specialist to change anti-hypertensive medications to pregnancy-friendly options.
- RAAS inhibitors are contraindicated in pregnancy.
- Non-teratogenic anti-hypertensives include nifedipine, labetalol and methyldopa.
- Aim for an office BP below 135/85 mmHg in these patients.
- On each visit from 20 weeks, urine should be assessed for proteinuria.
- Frequency of BP assessments is according to risk: 1–2 per week in cases of gestational hypertension or preeclampsia; 2–4 weeks in those with well controlled chronic hypertension. - This can be supported at the community level, as detailed earlier in the guideline.
- During antenatal visits women should be counselled on long term risks of hypertension in pregnancy and encouraged to seek annual healthcare after pregnancy.
- Pregnant women with hypertensive disorders should be followed up till at least 6 weeks after pregnancy. If BPs are still above target or require anti-hypertensive medication to remain controlled, further investigations and treatment should be instituted.

Hypertension in diabetes

Diabetes and hypertension synergistically increase the risk of HMOD, especially with respect to neuropathy and retinopathy [92]. Patients with diabetes mellitus also experience accelerated atherosclerosis, which increases risk of acute myocardial infarction and stroke [20]. Hypertension is

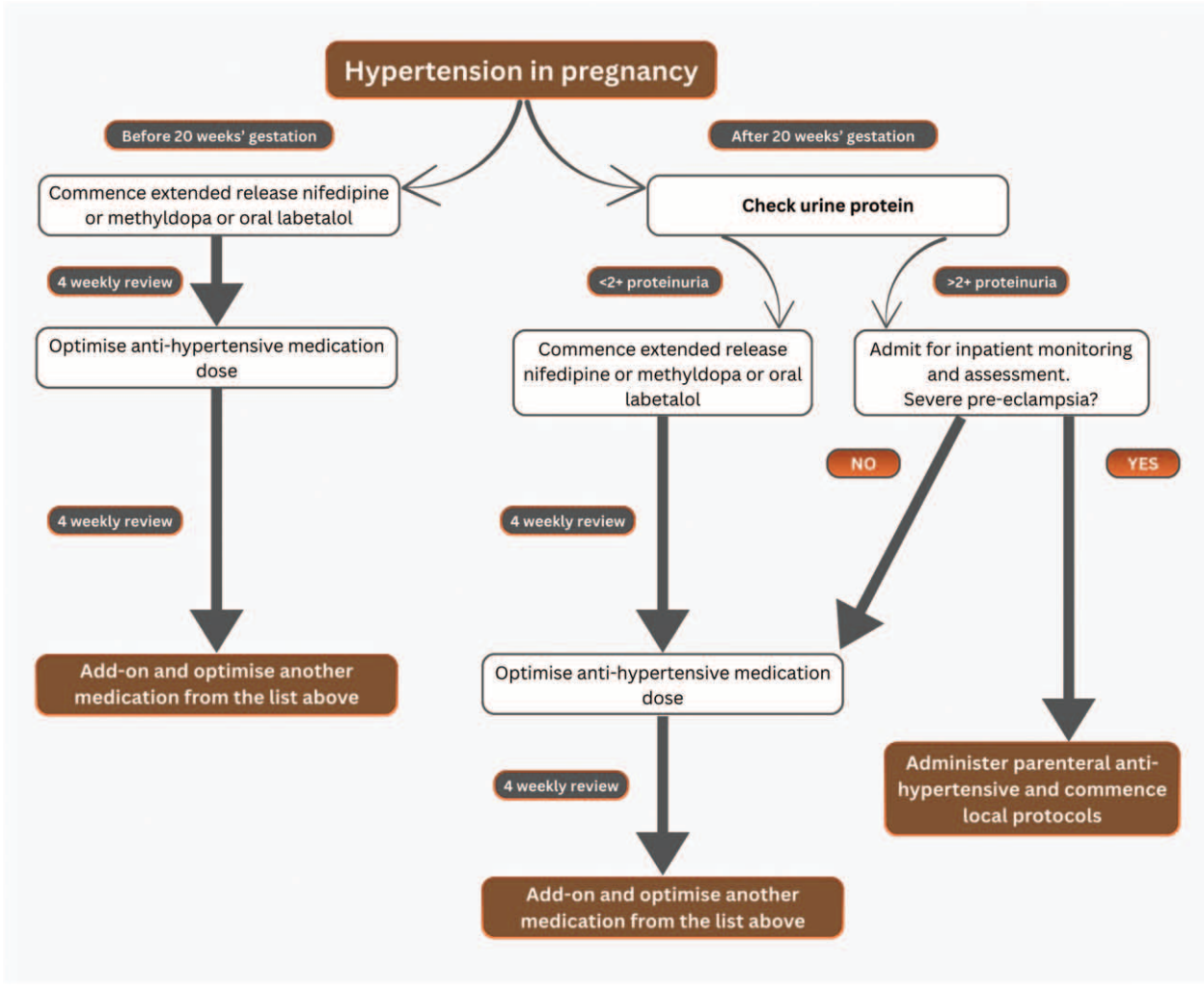

FIGURE 9 Management of hypertension in pregnancy.

therefore managed more aggressively in these patients than in non-diabetic hypertensives (Box 10).

Box 10 Recommendations in diabetes mellitus

- Where possible, patients with hypertension and type 2 diabetes mellitus must be managed by a doctor or under the supervision of a doctor (i.e., NPHWs can manage with support from a doctor).
- Where available, urine albumin-creatinine ratio (ACR) should be checked to serve as a baseline, facilitating the detection of new-onset nephropathy. Urine dipsticks can be used to detect nephropathy.
- Treat hypertension to a BP target of systolic below 130 mmHg and diastolic below 80 mmHg, if tolerated.
- 1st line of therapy includes an ACE inhibitors or ARBs, especially if there is proteinuria, with dihydropyridine CCBs as the preferred second drug.
- Thiazide diuretics are often needed but may increase glucose and triglycerides.
- Sodium-glucose like transporter-2 (SGLT-2) inhibitors and glucagon-like peptide-1 (GLP-1) receptor agonists are hypoglycaemic agents with BP lowering effects and may be considered in the management of such patients.

Hypertension in chronic kidney disease

Chronic kidney disease (CKD) is defined as the presence of reduced kidney function (an estimated glomerular filtration rate (eGFR) <60 ml/min/1.73 m^2) or kidney damage (structural changes, presence of proteinuria) for ≥ 3 months duration [93]. It affects about 10–15% of the population worldwide [93]. CKD is highly prevalent in Africa due to various reasons, including hypertension, diabetes, genetic risk, nephrotoxins, etc.

TABLE 11. Parenteral anti-hypertensives recommended for use in pregnant women with severe pre-eclampsia

Medication	Indication	Dose
Intravenous labetalol	1st line medication in hypertensive emergency in pregnancy	20 mg slow i.v. injection, repeated as 40 mg after 10 min then 80 mg after another 10 min then 80 mg finally (max dose of 220 mg)
Intravenous hydralazine	Alternative medication in hypertensive emergency in pregnancy	5–10 mg slow i.v. injection, repeated after 20 min, maximum dose is 20 mg

TABLE 12. Risk factors for developing pre-eclampsia[87,88]

Moderate risk factor	Major risk factor
Nulliparity	Previous hypertension in pregnancy
Age over 40 years	Chronic kidney disease
Pregnancy interval >10 years	Diabetes mellitus
Family history of pre-eclampsia	Chronic hypertension
Obesity	Autoimmune disease, e.g., systemic lupus erythematosus
Multiple pregnancy	

Hypertension and CKD share a reciprocal relationship, with uncontrolled hypertension causing CKD and CKD causing secondary hypertension. Atherosclerotic CVD is accelerated in patients with CKD, while there is an overall increase in the incidence of cardiac disease due to the cardiorenal syndromes. The risk of death due to CVD is higher among patients with CKD [93]. Lowering BP can slow eGFR decline, delay progression to end-stage disease, and reduce the incidence of CVD in these patients [93].

Proteinuria is an important marker of renal damage and is independently associated with CKD, determined by the urine albumin-creatinine ratio (ACR) or routine urinalysis. A urine ACR is more accurate when protein leak is minimal, with an ACR value of $\geq$30 mg/mmol sufficient for a diagnosis of CKD regardless of eGFR (Box 11).

Box 11 Recommendations in Chronic Kidney Disease

- All patients with CKD stage III A (i.e., eGFR between 45–60 ml/min/1.73 m^2) or elevated creatinine should be managed by a doctor.
- All patients with CKD stage III B and below (i.e., eGFR below 45 ml/min/1.73 m^2) should be managed by a doctor experienced in CKD care, preferably in consultation with a specialist or nephrologist, where available.
- Urine albumin-creatinine ratio (where available) and abdominal ultrasonography should be requested.
- Treat hypertension to a BP target below 130/80 mmHg, if tolerated.
- 1st line of therapy: ACE inhibitors or ARBs if eGFR >15 ml/min/m^2.
- ACE inhibitors and ARBs must be used with caution in patients with eGFR below 30 ml/min/1.73m^2.
- SGLT2, where available, must be prescribed to people with CKD and eGFR >20 ml/min/1.73m^2 under the care of a doctor.
- Non-steroidal MRAs provide cardiovascular and kidney benefit in those with diabetic kidney disease and proteinuria, if available, but may cause hyperkalaemia,.
- Thiazide diuretics are needed in most people with CKD, but should be used with caution, due to side effects and decreased efficacy. Patients with eGFR below 30 ml/min/1.73m^2 require a loop diuretic (e.g., furosemide), often in higher than usual dosing.

The thiazide-like diuretic chlorthalidone is effective and serves as an alternative therapeutic opportunity for patients with stage 4 CKD and uncontrolled hypertension [94]. Chlorthalidone can also mitigate the risk of hyperkalaemia to enable the concomitant use of spironolactone, but this combination requires careful monitoring of BP, serum sodium and potassium and kidney function. Metolazone also can be used 30 minutes to one hour before loop diuretics when hypertension and fluid overload coexist.

Hypertension in people aged >80 years

Poorly controlled hypertension is a particularly common and a powerful risk factor for CVD disease in older adults. Coupled with age and the higher tendency to have other comorbidities, older adults are likely to have a high CVD risk assessment profile.

Isolated systolic hypertension is particularly common among older people and accounts for reduced vasomotor activity, increasing the risk of falls due to autonomic dysfunction with failure of orthostatic adaptations on changing posture. This risk is impacted by the effects of polypharmacy due to concomitant conditions (Box 12).

Box 12 Recommendations for patients aged >80 years

- Antihypertensive medication dose titration may need to be slower to limit orthostatic hypotension and other side effects.
- Treat hypertension to a BP target of systolic below 130–140 mmHg and diastolic below 80–90 mmHg, if tolerated.
- Monotherapy is recommended to start treatment among older people with BP 160–179 mmHg/100–109 mmHg.
- Dual therapy must be considered for treatment initiation if BP >180/110 mmHg.

STRENGTHENING HEALTH SYSTEMS TO IMPROVE HYPERTENSION CARE

Considering the devastating effects of hypertension and its complications, it is prudent that pragmatic measures be taken to mitigate these effects. In line with this, there have been various suggestions to improve hypertension detection and management in Africa. The PASCAR roadmap and the WHO Package of Essential Non-communicable Disease Interventions (PEN) developed major initiatives for this purpose.

PASCAR roadmap

The detection and control of hypertension in Africa is influenced by various factors, related to healthcare system (government), healthcare workers, and patients [5]. PASCAR proposed interventions aiming at reducing the hypertension care gap, which refers to the discrepancy between evidence-based recommended care and the actual care provided [5]. The PASCAR roadmap identifies the role of government through policy initiatives to improve detection and access to care, increasing health worker capacity through training and practice guidelines, and research into locally relevant alternatives to develop optimal rather than essential quality of care [15]. Implementing this action plan requires collaboration between various sectors/departments within both the public and private sector.

WHO Package of essential non-communicable disease interventions and WHO HEARTS

The WHO PEN is a guide for the screening, diagnosis, investigation and management of noncommunicable diseases, such as hypertension in primary care, particularly in low-resource settings [64]. It provides an evaluation plan and the use of WHO risk assessment tools, standardized per region.

The WHO PEN recommendations advocate for improved self-care, with patients having access to home BP devices for self-monitoring. Non-pharmacological management is recommended for all levels of CVD risk, while those

with a risk above 20% require concomitant initiation of pharmacological therapy for hypertension. Pharmacological therapy is considered after failure of non-pharmacological interventions in patients with a 10–20% risk. The WHO HEARTS presents an implementation guide for cardiovascular health in countries aiming at supporting management in primary care settings.

CONTEMPORARY SOLUTIONS TO IMPROVE THE MANAGEMENT OF HYPERTENSION IN AFRICA

Hypertension management is typically offered by doctors in clinics. This results in a significant unmet need, as most hospitals with doctors are concentrated in the more urban areas. Furthermore, there is a ratio of five physicians to 10 000 people in most countries in SSA [2]. Even in these urban health facilities, data from 2020 showed that there were registered cardiologists in just 18% of countries in SSA, with a dependence on care from visiting specialists [2]. This limits the amount of time spent with patients to counsel on their diagnosis, its complications, and the management (both pharmacological and non-pharmacological). The distance and road network leading to these hospitals may result in individuals reporting to community health centres or pharmacies with their health concerns, including hypertension-related concerns, for attention. Once the health-seeking habits of these people are understood, appropriate stakeholders in healthcare delivery can be identified and empowered to augment the work of doctors in caring for such people.

There is also a high penetration of technology in society. Many individuals, youth and adults, use mobile phones or tablets on a regular basis, with access to the internet through various network service providers. This provides the platform for digital alternatives in ensuring good hypertension control among both physicians and patients through repeated educational messages and affording an easily retrievable BP diary for quick review [79,95].

The ISH African Hypertension School (AHS) is an initiative by the ISH Africa Regional Advisory Group (RAG) to train NPHWs in Africa on hypertension management. The AHS for NPHWs was piloted in August 2022 [96]. It involved 94 NPHWs from 8 African countries over 20 weeks, with an 8-week online lecture phase and a 12-week mentorship phase. Participants were assessed in various areas, including their previous knowledge of hypertension, assessment of new knowledge following the programme, interaction between faculty and participants, and implementation of knowledge learned. These yielded positive results, demonstrating that NPHWs, when offered mentorship and guidance, can offer a satisfactory level of hypertension care in society. It is therefore a viable option to be adopted and expanded by various African governments to improve local care.

Task sharing

This refers to employing the services of other NPHWs to perform health/care-related tasks that originally fall outside their regular job description [97]. This approach allows for up-skilling of healthcare workers and can be employed in the management of hypertension. This increases the number of staff with the requisite skill set to achieve specific results [79].

Such training will allow for more people at various levels within the community to be able to access healthcare. Diagnosis and treatment of hypertension in Africa should not be regarded as the sole responsibility of doctors. Given the severe shortage of physicians and specialists, and the fact that most available doctors are non-specialists, hypertension care must be task-shared to include nurses, health technicians, and NPHWs. These cadres should be formally empowered to diagnose, prescribe, and monitor patients within structured systems of physician oversight and referral. In addition, evidence from the TASMIN studies highlights the value of patient self-management [98–100], where individuals are trained to monitor their own blood pressure and adjust medications using simplified treatment algorithms. Incorporating such approaches alongside task sharing strengthens accessibility, promotes patient empowerment, and ensures that safe, effective, and context-appropriate hypertension management is delivered at the primary care level across diverse African settings [97].

Lifestyle and diet are another important differentiating issue. While there is evidence of the benefit of diets such as DASH [73] and the Mediterranean diets [73,101], these are based on non-African dietary staples. The involvement of dieticians with expertise in tailoring African-based foods to meet cardiovascular needs is vital in attempts to improve dietary practices.

Moreover, Africa has the highest unmet need with regards to psychosocial disturbances [102], and the role of stress, anxiety and depression in hypertension is well known. The role of counselling on lifestyle modifications, adherence and complications of hypertension in managing patients is especially relevant at an individual and population level [5]. Doctors are too few and have limited time, not only in Africa (but more so) but all over the world, and NPHWs must contribute and become important players. Public health professionals, nurses and other educators are required to improve awareness of hypertension to facilitate diagnosis and management among both undiagnosed, new and old cases. The educational role also requires community and religious leaders [5], as well as both print and electronic media to broadcast educational efforts on preventive and management practices widely. Schools are also an important target for such health education programmes. Promoting cardiovascular health should be included in school curricula to ensure that children grow with an understanding of how to safeguard cardiovascular health.

Achieving these goals requires deliberate governmental policies facilitating the education of such essential non-doctor healthcare providers, their employment, and deployment at the community level. The cost of such efforts will also need to be subsidized to promote continuity and efficacy. While some countries across the world have implemented sugar taxes to help reduce obesity rates [103], similar approaches can be taken with respect to other risks like alcohol intake and tobacco smoking, as well as high sodium/salt content foods [28,104]. The production of

low sodium-content stock cubes for cooking can be explored as well (Box 13) [105].

Box 13 Recommendations in task sharing

- Qualified stakeholders can be identified and a standardized curriculum developed to ensure appropriate understanding. Categories of individuals who can be trained include [54,68,69,106]:
  - ○ Nurses
  - ○ Physician assistants
  - ○ Community health workers
  - ○ Pharmacists/dispensary technicians
  - ○ Other relevant community champions
- Dieticians are required to adapt dietary models using locally available and affordable foods to enable compliance [74].
- Services be made available for psychosocial support.
- Utilize telemedicine and mobile health technologies to lifestyle change, treatment adherence, and long-term monitoring, and thereby optimize BP control.

Telemedicine and digital health solutions

The use of several teleconferencing applications, which are widely available and free of charge, may help reduce hospital visits by stable patients, affording more time between the physician and patients for quality care and avoiding travel costs for patients [107]. This has significant potential benefit for improved hospital access by those in rural settings [108]. Low-risk patients may be given an appointment to log in to a meeting with laboratory test results and self-BP monitoring charts, while the moderate and high-risk patients may maintain most of their in-person consultations. Furthermore, hospitals can develop specific areas on hospital websites that allow patients to access information and request assistance from their healthcare professionals. This will allow the physician to make changes to therapy when alerted by high BP readings and can also help arrange visits ahead of the scheduled day, as necessary. This is however an area requiring more evidence for suitability among the broader African population [108].

Digital health solutions offers a promising way to bridge gaps in African care. Telemedicine platforms including mobile health (mHealth) apps, SMS, and remote monitoring can link HIV/ART clinics, primary care nurses, and specialist physicians into coordinated care networks [109]. For example, sharing BP data and advice via telehealth can improve HTN management in remote settings.

Mobile health

Mobile health (mHealth) refers to the use of mobile phone applications to support healthcare delivery [62]. These applications can be tailored to user needs and adapted for multiple purposes, making them a flexible and cost-effective tool for hypertension care, particularly in remote areas where access to healthcare providers is limited. The mHealth enables remote BP monitoring [95], as patients can enter home BP readings that are visible to physicians in real time. This allows for earlier therapy adjustments rather than waiting for scheduled visits [62]. Applications can also provide medication reminders, prompts for self-checks, educational material on lifestyle modification, information on side effects and complications, and guidance on when to seek care, reinforcing patient education outside the clinic [68,110]. In addition, mHealth platforms can store and share summaries of key clinical information, ensuring continuity of care across different providers and facilities. They also facilitate multidisciplinary collaboration and allow non-physician health workers to seek virtual advice from doctors for complex cases, strengthening frontline hypertension management.

SOCIOCULTURAL ASPECTS OF HYPERTENSION

Culture defines the practices and perceptions of people of a particular descent, including perception of health, dietary habits, lifestyle, exercise habits, among others. These have significant influences on the adoption of cardiovascular-friendly behaviours, directly impacting the management of hypertension.

There are religious and sociocultural influences that affect attendance to hospital and conduct in hospital. In some African cultures, females are required to be given approval and money to attend hospital by their husbands, while they may also need their husbands' permission to consent to a regular physical examination in hospital, especially if it involves a male physician [111]. This is particularly important as the evaluation of hypertension goes beyond just checking BP but includes a complete physical examination.

Among Islamic faith practitioners, principles of modesty may result in preference for same-gender healthcare workers, particularly among females, for such examinations [112], while the positions of men as heads of households may result in them refusing care from female practitioners. Care-givers should be sensitive to these religious and cultural preferences to optimize care.

Dietary habits and over-cooking (rapid destruction of essential minerals and potassium) are heavily influenced by culture. Many African staples are carbohydrate dense, low-quality foods [113,114]. Considering the recommendation according to the DASH and Mediterranean diets, this may hamper the optimal management of hypertension and other CVD risk factors. In some African countries, it is considered a "sign of good living" when men and women alike put on weight. They therefore may not appreciate their weight being excessive for optimum health [115,116]. Women with increased fat deposition around the pelvic girdle and buttocks are the subjects of admiration, while men with significant abdominal fat deposition ("pot belly") are considered hardworking and wealthy, rather than unhealthy. Even among children, obesity is rising, predominantly among the affluent in SSA [103,115]. These beliefs therefore have heavy influences on the food types and portions that are eaten to improve one's status in the community, at the cost of cardiovascular health. Many African cooks, especially commercial, rely on bouillon cubes that are rich in sodium in addition to table salt, to enhance flavour [105]. Another important dietary consideration in African countries is meat and fish preservation. There is a high rate of preservation by salting, and salted meats and fish are considered delicacies. The role between salt and hypertension is well established and therefore this practice could contribute to the development of hypertension and poor control in hypertensive patients.

Lastly, there is a strong belief in alternative medicines derived from plant-based substrates compared to orthodox medicines [117]. While this may not always be a problem, these alternative medications are far less stringently regulated and without proper post-marketing surveillance than the approved medications [117,118]. The compositions of these are often unknown. Individuals harvest leaves, barks, and roots of trees, mix with other herbs and prepare into a liquid medium by various means. These are packaged, labelled without information on composition, and they are marketed as a panacea for various ailments. Unfortunately, they can result in kidney disease, which contributes to secondary hypertension or livery injury. There is also a higher rate of adulteration with unspecified amounts of orthodox medications, which may be blended into the mixture without the knowledge of patrons. Therefore, there may be a higher risk of side effects affecting various organ systems, contributing to increased morbidity.

Leveraging culture to improve blood pressure control

Improving BP control requires advocacy for changes in some cultural practices, and this is difficult as culture defines a population. It requires identifying aspects of culture that contribute to worsening cardiovascular health and educating the public on them. In many African cultures, premium focus is placed on respecting leaders and governing officials. One is not expected to question older people and leaders who have oversight responsibilities.

Considering this, it is imperative to include community, religious leaders, sports and music stars and other celebrities in BP control strategies, as their views are highly respected in communities and youth. Their views on such matters can be reassuring to citizens who are unwilling to contravene the accepted practices of their tribe/religion/creed. Furthermore, prominent figures in the community have a wide coverage. Chiefs can lead community-wide broadcasts through their linguists, leaders in the media and political space can feature educational material in their broadcasts and rallies, while religious leaders can reach many in places of worship. This will be a feasible way of spreading education. Once the leaders agree to be part of hypertension control campaigns, stations can be set up at vantage points in public spaces to allow for routine BP screening to improve diagnosis, such as places of worship, town halls, among others.

The family is the basic unit of a community, and Africans have strong bonds with family. This relationship can help improve the care given to patients with hypertension. Including family in the care process, with consent of the patient, allows them to serve as checks to ensure adherence to reviews and medications [119,120]. This will be particularly useful in cultures and religions where it is frowned upon for ladies to give sensitive personal information and expose their bodies to males [112]. Being accompanied by husbands, who are also heads of the family, will allow for more thorough and accurate assessments, as well as having an accountability partner to ensure long-term monitoring and adherence to medical therapy.

Traditional medicines and healers, which are preferred by many Africans, should be researched thoroughly to determine if they have evidence-based roles as options for those who will prefer not to take orthodox medications. There is a high patronage of traditional healers for various medical ailments [117], including hypertension. This presents an opportunity to improve the quality and availability of traditional anti-hypertensive alternatives, for prescription by both traditional and orthodox healthcare workers. These medications will need to have the same stringent standards as orthodox medications, going through the same degree of research, clinical trialling, declaration of content concentrations, and post-marketing surveillance to ensure safety of patrons [117,118,121]. Bans should be placed on unlicensed sale of such preparations with legal penalties for those who facilitate the unlicensed preparation and use of such preparations. In view of this, there should be the development of institutionalized programmes that seek to improve the safe development of traditional medicines for this purpose, with a similar level of funding as seen in the development of orthodox medicines. Given the ample flora in SSA, this may even be a cheaper alternative to importing orthodox medicines and its substrates. There is however the need for consistent governmental commitment to achieve this. African plants have shown antihypertensive effects in trials. For example, *Hibiscus sabdariffa* (bissap) significantly lowered SBP (~−11 mmHg vs. −16.7mmHg for ramipril) and promoted natriuresis in a Senegal RCT [122]. Likewise, a Tanzanian study found that daily beetroot juice (nitrate) reduced 24-h systolic BP by ~10.8 mmHg [123]. These promising findings underscore the need for more local research on traditional remedies and their safety in hypertension.

There is a perception that well-kept hair is an integral part of culture in Africa. This results in people spending time in salons and barber shops, where patrons seldom spend less than an hour. Some of these places have been transformed to social centres in a sense, where people come together to chat, watch football games, etc., therefore an excellent avenue for opportunistic hypertension screening [66]. Supplying these places with automated BP monitors will allow effective screening for hypertension, improving detection and early management. Similarly, flyers and posters with crucial information can be made available, potentially improving treatment adherence.

RECOMMENDATIONS AND RESOURCES

Key recommendations beyond clinical management of hypertension

Multisectoral collaboration

One key recommendation is for multi-sectoral collaboration based on the One Health approach [124], encouraging public health strategies that integrate lifestyle management, environmental factors, and social determinants in the prevention and control of hypertension through integrated surveillance, prevention, and health promotion efforts. There is need to embed hypertension management within broader NCD and One Health frameworks such as WHO-PEN and WHO-HEARTS technical packages that emphasize standardized treatment protocols combined with public health approaches targeting lifestyle and environment.

Comprehensive partnerships are required to achieve these, both through governmental intersectoral collaboration and public-private sector partnerships. Institutions in health are pivotal in advancing the recommendations, while financial institutions are required to fund their implementation. Non-health agencies, like environmental and social services, can work to address risk through the reduction of exposure to environmental risk factors (e.g., air and water quality, pollutants) that can influence BP and cardiovascular risk, and the promotion of healthy lifestyle interventions that consider community-wide food safety, nutrition, physical activity, and control of environmental stressors. The communication industry will help reach the masses with appropriate information and reminders, coupled with innovations from the information technology sector. All these will require the cooperation of traditional leadership to adequately penetrate communities and families to have the desired impact. Educational curricula can also be modified to include such health education, ensuring that all citizens going through formal education, and not just health workers, are trained in these vital lifestyle modifications to improve overall quality of life. It is therefore evident that collaboration between health (including orthodox, traditional and pharmaceutical), financial, communication and education sectors is essential for the success of hypertension control efforts.

Legislation/primordial prevention

Legislation also plays a key role in contributing to improved hypertension control. The role of lifestyle in perpetuating hypertension is established, and this can be targeted to reduce the incidence of hypertension, as well as improve its control. There must also be conscious efforts to improve public spaces to allow for outdoor physical activity. This will improve physical recreational activities within the community and contribute to overall health and wellbeing.

Task sharing and digital solutions

Through task sharing, community staff empowered to care for patients with hypertension can serve as focal points for the development of community wellness clinics in their localities. This will ensure that a good standard of care is available even to those outside the urban areas. Additionally, individuals within various communities may be identified and assisted with scholarships to study relevant programmes that allow them to offer specific care. These individuals may undergo, for example, a six-month intensive programme in care for patients with hypertension in addition to their primary qualification, such as the AHS, and return to the community to serve in that capacity.

Health financing

The use of medications is a core component in managing hypertension, and this requires availability of quality medications at affordable prices for people to purchase. There is the need for investment in quality medications, both originator and generic, to improve BP control. Fixed-dose combinations result in lower pill burdens without compromising on quality, and it is encouraged that these be procured for local use. Such medications will benefit from being included in essential medicines lists which reduce imposed taxes [125], make importation easier and increase access, culminating in better BP control. The development of robust health insurance packages through public-private governmental partnerships will undoubtedly contribute to improved access to quality mediations for BP control. Furthermore, the cost of comprehensive diagnostics to assess the severity/stage of hypertension and assess for HMOD is often high. While many private health insurance and corporate insurance packages can afford members free access to these, the average citizen who depends on national health insurance is unable to have access to these, underscoring the need for dependable financial support in the form of insurance.

Community engagement

The involvement of family and community in managing hypertension and other CVDs improves care. Building on this finding, it will be beneficial to institute advocacy and support groups that serve as sources of legitimate information for patients with hypertension. Such groups serve to encourage patients, allow for discussion of concerns, side effects, etc., and provide an avenue for more community-level engagement on hypertension and its related issues.

Research

Sustaining the improvement in hypertension care in Africa requires research to identify reliable contemporary methods that improve detection through screening opportunities and investigative modalities, and management of patients diagnosed with hypertension. This includes research into alternative medicines that can be produced locally at relatively lower costs for the treatment of hypertension. Such research is however capital intensive and requires funding. It is evident that the burden of disease has shifted from communicable to non-communicable diseases, and adequate financial investment is imperative to improving health and national productivity. In addition to making funds available for research, there must be conscious efforts to improve the research capacity of relevant stakeholders through training in research methods and ethics. This will ensure the generation of more modern robust research data to inform national policies to improve cardiovascular care in SSA.

Key resources

Lists of validated devices for use in the office, at home, or for 24-h ambulatory monitoring in adults, children, and pregnant women are available at www.stridebp.org.

World Health Organization/International Society of Hypertension (WHO/ISH) risk prediction charts [126].

CONCLUSION

This is the first Africa-specific hypertension guideline which includes recommendations and standardization of hypertension management across the life course. Improving hypertension control in Africa demands coordinated action by uniting sectors, enacting preventive policies, engaging primarily non-doctor healthcare professionals, empowering

community-based care through task shifting, and implementing technology, and ensuring sustainable financing. Together, these strategies create an integrated framework capable of transforming prevention, treatment, and long-term outcomes.

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Conflicts of interest

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