Consensus Document

2024 Latin American Society of Hypertension guidelines on the management of arterial hypertension and related comorbidities in Latin America

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Hypertension is responsible for more than two million deaths due to cardiovascular disease annually in Latin America (LATAM), of which one million occurs before 70 years of age. Hypertension is the main risk factor for cardiovascular morbidity and mortality, affecting between 20 and 40% of LATAM adults. Since the publication of the 2017 LASH hypertension guidelines, reports from different LATAM countries have confirmed the burden of hypertension on cardiovascular disease events and mortality in the region. Many studies in the region have reported and emphasized the dramatically insufficient blood pressure control. The extremely low rates of awareness, treatment, and control of hypertension, particularly in patients with metabolic disorders, is a recognized severe problem in LATAM. Earlier implementation of antihypertensive interventions and management of all cardiovascular risk factors is the recognized best strategy to improve the natural history of cardiovascular disease in LATAM. The 2024 LASH guidelines have been developed by a large group of experts from internal medicine, cardiology, nephrology, endocrinology, general medicine, geriatrics, pharmacology, and epidemiology of different countries of LATAM and Europe. A careful search for novel studies on hypertension and related diseases in LATAM, together with the new evidence that emerged since the 2017 LASH guidelines, support all statements and recommendations. This update aims to provide clear, concise, accessible, and useful recommendations for health professionals to improve awareness, treatment, and control of hypertension and associated cardiovascular risk factors in the region.

Keywords: antihypertensive drug therapy, associated cardiovascular risk factors, blood pressure, cardiovascular disease, drug combinations, guidelines, hypertension, lifestyle interventions, organ damage, secondary hypertension

Abbreviations: ABI, ankle–brachial index; ABPM, ambulatory blood pressure monitoring; ACEI, angiotensin-converting-enzyme inhibitor; ACR, albumin/creatinine ratio; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor neprilysin inhibitor; ARR, aldosterone–renin ratio; ASCVD, atherosclerotic cardiovascular disease; AV, atrio-ventricular; baPWV, brachial–ankle pulse wave velocity; BNP, brain natriuretic peptide; BP, blood pressure; BSA, body surface area; CAC, coronary arterial calcium; CAD, coronary or ischemic heart disease; CCB, calcium channel blocker; cfPWV, carotid–femoral pulse wave velocity; CKD, chronic kidney disease; CKD-EPI, Chronic Kidney Disease Epidemiology Collaboration equation; CMR, cardiac magnetic resonance; COPD, chronic obstructive pulmonary

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disease; CVD, cardiovascular disease; DM-2, type 2 diabetes mellitus; eGFR, estimated glomerular filtration rate; GLP-1, glucagon-like peptide-1; HbA1c, hemoglobinA1c; HBPM, home blood pressure monitoring; HDL, high-density lipoprotein; HDP, hypertensive disorders in pregnancy; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; HMOD, hypertension-mediated organ damage; HT, hypertension; IDH, isolated diastolic hypertension; IMID, immune-mediated inflammatory diseases; IMT, intima–media thickness; ISH, isolated systolic hypertension; IVT, intravenous thrombolysis; LDL, low-density lipoprotein; LMIC, low-income and middle-income countries; LV, left ventricle; LVDD, left ventricular diastolic dysfunction; LVEF, left ventricular ejection fraction; LVH, left ventricular hypertrophy; LVM, left ventricular mass; MACE, major adverse cardiovascular events; MMSE, Mini Mental State Examination; MoCA, Montreal Cognitive Assessment; MRA, mineralocorticoid receptor antagonist; OBP, office blood pressure; OBPM, office blood pressure monitoring; OSA, obstructive sleep apnoea; PAC, plasma aldosterone concentration; PRA, plasma renin activity; PTRA, percutaneous transluminal renal angioplasty; PWV, pulse wave velocity; RAAS, renin–angiotensin–aldosterone system; RAS, renin–angiotensin system; RCT, randomized controlled trial; RDN, renal denervation; RVH, renovascular hypertension; RWT, relative wall thickness; SGLT2i, sodium-glucose co-transporter-2 inhibitor; SNS, sympathetic nervous system; SVD, small vessel disease; TIA, transient ischemic attack; UACR, urinary albumin/creatinine ratio; WCH, white-coat hypertension; WML, white matter lesion

INTRODUCTION

The problem of hypertension and related comorbidities in Latin America

In Latin America (LATAM), hypertension is responsible for more than two million deaths due to cardiovascular disease (CVD) annually, of which one million occurs before 70 years of age. Hypertension is the main risk factor for coronary and cerebrovascular disease, affecting between 20 and 40% of Latin American adults. There is also a close association between hypertension and heart failure, and blood pressure (BP) elevation is a major cause of end-stage renal disease (CKD) and peripheral artery disease (PAD) [1,2]. Since the publication of the 2017 LASH hypertension guidelines [1], further reports from different LATAM countries have confirmed the burden of hypertension on cardiovascular events, cardiovascular mortality, and all-cause mortality in the region.

Why is important to disseminate specific hypertension guidelines for LATAM? LATAM has a high prevalence of the metabolic syndrome and type 2 diabetes (DM-2) associated to hypertension; LATAM countries have a high prevalence of a series of ethnic, economic, geographic and cultural characteristics that contribute to the high prevalence of hypertension; socioeconomic inequalities, highly prevalent in LATAM mainly associated to specific ethnicities are recognized as cardiovascular risk factors (CVRF); difficulties in access to health services between urban and rural areas are additional determinants of the differences in the prevalence of CVD risk factors and their management.

Many studies in the region have reported and emphasized the dramatically insufficient BP control in LATAM. The extremely low rates of awareness, treatment and control of hypertension in the general population, and particularly in patients with metabolic disorders is a recognized severe problem. As pointed out by Zanchetti *et al.* [3], the differences between international scientific societies in establishing the BP thresholds to initiate treatment and the BP targets to be achieved for the optimal reduction in major cardiovascular events (MACE) may have contributed to this situation. Earlier implementation of best antihypertensive interventions and management of all CVRF is the recognized best strategy to improve the natural history of the cardiovascular disease in LATAM [4].

The 2024 LASH guidelines have been developed by a large group of experts from different LATAM countries and Europe, representing the areas of internal medicine, cardiology, nephrology, endocrinology, general medicine, geriatrics, pharmacology, and epidemiology. A careful search for novel studies on hypertension and related diseases in LATAM, together with the new evidence that emerged since the 2017 LASH guidelines, support all statements and recommendations. This update aims to provide clear, concise, accessible, and useful recommendations for health professionals to improve awareness, treatment, and control of hypertension and associated CVRF in LATAM. As a novelty, the recommendations are graded with class and level of evidence using a simplified model based on the 2023 ESH hypertension guidelines [2] as shown in Fig. 1.

It is important to emphasize that the guidelines recommendations are not invariably prescriptive for individual patients because they are based on average data from cohorts or populations, thus addressing conditions or diseases in general, that may not fit the specific characteristics of an individual patient. For this reason, in a number of individuals the most appropriate diagnostic and treatment decisions may differ from those expressed by the guidelines, which implies that physicians should personalize their decisions by applying the general knowledge to the characteristics of the patient.

What is new in the 2024 Latin American society of hypertension guidelines?

The most important news with respect the 2017 guidelines may be summarized as follows:

1. Use of a simplified criteria for grading the evidence supporting statements and recommendations.
2. Update of the current epidemiology of hypertension and related comorbidities in LATAM.
3. New recommendations about office and out-of-office BP measurements.
4. More precise approach to the diagnostic and clinical evaluation of hypertension.
5. Update and adaptation of lifestyle changes according to the culture and habits of the LATAM population.
6. Update on threshold and targets for antihypertensive drug treatment.
7. New algorithm of pharmacological treatment of hypertension.

Class of Recommendation	Definition	Level of Evidence	Definition and interpretation
I	General agreement that a treatment, test or procedure is beneficial, and that benefits outweigh potential risks. Must be implemented.	A	RCTs with CVD outcomes or their meta-analysis. - Single trial enough with sufficient power and without important limitations. Strong evidence.
II	Conflicting evidence about the benefit of a treatment, test or procedure, or uncertainty about benefit/risk balance. May be implemented.	B	RCTs with surrogate measures (BP, HMOD) or - Observational studies with CVD outcomes, or their meta-analysis. Moderate evidence.
III	Evidence or general agreement that a treatment, test or procedure is not beneficial, or that potential risks outweigh potential benefit. Should not be implemented.	C	Observational studies of surrogate measures or with CVD outcomes or - With important limitations. - Expert opinion. Week evidence.

RCTs: randomised clinical trials; CVD: cardiovascular disease ; BP: blood pressure; HMOD: hypertension mediated organ damage.

FIGURE 1 Class of recommendation and level of evidence used in the present guidelines. BP, blood pressure; CVD, cardiovascular disease; HMOD, hypertension-mediated organ damage; RCTs, randomized clinical trials.

8. Treatment of associated CVRF.
9. How to manage hypertension in special populations.
10. New approach to hypertension in women.

EPIDEMIOLOGY OF HYPERTENSION AND RELATED COMORBIDITIES IN LATIN AMERICA

Hypertension contributes with the highest population attributable fraction to cardiovascular events and cardiovascular deaths [5,6]. Table 1 shows the prevalence of hypertension in LATAM general population as reported from different countries (https://www.who.int/data/gho/data/indicators/indicators-index). Most countries have experienced either an increase or no material change in the age-standardized prevalence of hypertension since 1990. In 2019, the prevalence of hypertension among countries in this region ranged widely between 18 and 62% (https://www.who.int/data/gho/data/indicators/indicators-index) [7–9].

Pooled analyses of studies by the NCD Risk Factor Consortium reported that in LATAM, 72% of women with

TABLE 1. Hypertension prevalence, treatment rates and control rates in Latin American countries

Country	Prevalence % (95% CI)[a]		Treatment % (95% CI)[a]		Control % (95% CI)[a]	
	Men	Women	Men	Women	Men	Women
Argentina	54.0 (45.1–62.9)	41.2 (33.7–49.3)	35.3 (24.9–46.4)	48.1 (35.0–60.5)	11.0 (5.4–18.7)	19.4 (10.1–31.6)
Bolivia	29.4 (15.3–47.1)	27.2 (14.8–42.6)	39.3 (15.6–67.2)	59.8 (29.1–86.2)	19.3 (3.9–45.2)	33.7 (9.0–66.9)
Brazil	47.9 (40.2–55.6)	42.1 (35.1–48.9)	54.4 (44.9–63.8)	69.8 (60.3–78.4)	28.1 (18.5–39.2)	38.9 (26.4–52.1)
Chile	39.0 (29.8–48.2)	33.1 (25.3–41.5)	49.9 (36.8–62.8)	68.2 (54.1–81.0)	26.7 (14.4–42.6)	41.8 (24.3–60.9)
Colombia	31.1 (21.4–41.9)	30.8 (21.8–40.6)	45.6 (30.9–61.6)	63.9 (46.6–79.3)	24.0 (9.9–43.1)	41.0 (20.5–64.0)
Costa Rica	36.0 (26.9–45.6)	39.4 (29.6–48.9)	63.5 (50.7–75.7)	76.1 (63.8–86.2)	45.4 (28.3–63.2)	53.5 (34.4–72.9)
Cuba	40.3 (27.6–53.9)	39.5 (27.5–52.8)	52.5 (33.0–71.3)	68.6 (47.9–84.6)	27.6 (10.4–50.5)	38.0 (15.3–64.0)
Dominican Republic	49.0 (35.5–62.2)	49.2 (36.5–62.4)	46.4 (28.2–64.7)	60.1 (40.3–78.0)	17.9 (5.5–36.5)	25.1 (8.0–48.9)
Ecuador	29.2 (22.0–37.2)	25.1 (18.9–32.1)	37.2 (26.0–49.1)	63.0 (49.6–75.1)	18.2 (9.6–29.1)	40.0 (24.9–56.1)
El Salvador	31.4 (22.2–41.8)	33.6 (24.2–43.8)	50.6 (34.6–66.3)	71.0 (55.7–84.1)	26.6 (12.5–44.1)	48.3 (28.2–68.5)
Guatemala	31.5 (21.0–43.1)	32.6 (22.9–44.1)	30.3 (16.0–47.5)	40.4 (22.9–60.7)	14.7 (4.7–31.1)	22.7 (8.3–43.3)
Honduras	33.2 (20.1–48.2)	34.4 (22.2–48.5)	47.9 (24.6–70.9)	67.3 (43.2–86.8)	25.4 (7.2–52.1)	39.0 (13.5–69.1)
Mexico	32.8 (26.4–39.2)	31.4 (25.8–37.2)	39.3 (30.3–48.8)	59.7 (48.8–69.3)	21.2 (13.5–30.5)	33.7 (22.7–45.7)
Nicaragua	34.5 (21.1–50.6)	36.9 (23.3–52.1)	49.7 (25.4–73.5)	69.2 (44.9–88.6)	25.8 (7.2–52.2)	41.8 (15.1–71.5)
Panama	36.8 (23.8–51.3)	35.3 (23.8–48.2)	45.7 (26.7–66.2)	63.9 (41.8–82.7)	21.4 (6.8–43.4)	35.8 (13.9–62.0)
Paraguay	61.6 (47.8–74.4)	50.9 (38.0–64.2)	28.4 (15.3–44.1)	48.9 (29.8–68.2)	8.4 (2.0–20.0)	17.9 (5.0–38.1)
Peru	22.8 (19.0–27.1)	18.4 (15.3–21.8)	28.9 (23.1–35.0)	53.7 (44.9–62.0)	14.1 (9.5–19.4)	31.1 (22.8–40.4)
Uruguay	46.0 (35.0–57.4)	38.9 (29.3–49.5)	47.3 (33.0–61.6)	62.6 (46.5–76.7)	24.9 (11.2–42.1)	33.4 (16.1–54.2)
Venezuela	39.7 (30.1–50.0)	39.1 (30.5–48.5)	54.2 (40.5–67.8)	71.3 (57.5–83.2)	25.3 (12.9–41.4)	39.6 (22.4–58.2)

CI, confidence interval.
[a]Among adults aged 30–79 years, age-standardized (in 2019).

hypertension were aware of the diagnosis, 64% were treated, and 35% controlled, whereas in men, 57% were aware of the diagnosis, 47% were treated, and only 23% controlled [7]. These data are very similar to those reported by the WHO (https://www.who.int/data/gho/data/indicators/indicators-index).

The high prevalence of hypertension and its low rates of awareness, treatment, and control in LATAM contribute to explain why in this region, the number of premature cardiovascular deaths are higher in comparison with the USA and Europe. New CVD cases in LATAM nearly doubled from 2 million in 1990 to 4.1 million in 2021 whereas the total number of prevalent CVD cases in this region increased from 20 million to 47 million during the same period, most likely, population growth and ageing [8,10].

Table 2 describes the prevalence of CVRF associated with hypertension (obesity, sedentarism, alcohol consumption, and diabetes mellitus), and major health indicators that may influence the prevalence and control of hypertension (life expectancy at birth, universal health coverage, amount of the gross domestic product as a percentage spent in health, and the Gini coefficient, in LATAM countries). The Gini coefficient expresses the inequity and disparities among country's populations, and the distribution of its resources and money income. These data demonstrate the high prevalence of CVRF and the elevated rates of inequity and disparities in LATAM (https://www.who.int/data/gho/data/indicators/indicators-index; https://diabetesatlas.org/data/en/indicators/2/; https://data.worldbank.org/indicator/; https://cdn.who.int docs whs2023_annex1; https://statistics.cepal.org/portal/cepalstat/dashboard.html?theme=1&lang=es].

The substantial lifestyle changes that LATAM countries experienced during the last decades [11], with an increased consumption of processed and ultra-processed food [12] and sedentarism induced by the mechanization of work and recreational activities [13], are crucial elements for the increase of CVRF in the region, with the consequent increase of the global cardiovascular risk. The industrialization of LATAM countries has contributed to increased air pollution and noise, known cardiovascular risk factor [14], what is added to the persistent socioeconomic and educational inequities in LATAM countries [15–17]. Given the importance of social determinants of health on hypertension and CVRF in LATAM, a major challenge is to achieve the participation of all social sectors to implement the global programs to improve hypertension control [11,16–18].

Among the many actions needed to improve hypertension control, the availability and patient's access to antihypertensive medications, the adherence of physicians and healthcare teams to current guidelines recommendations, and the use of combination therapy comprising two or more medications since the beginning of the treatment, ideally in a single pill, and even polypills including two antihypertensive medications and one statin need to be highlighted [19–23].

The lack of routine physical activity in the region have shown an alarming situation considering the negative influence of this sedentary lifestyle on the prevalence of

TABLE 2. Prevalence of cardiovascular risk factors associated with hypertension and socioeconomic characteristics in Latin America

Country Year	Obesity % (95% CI)[a] [5] 2022	Physical inactivity % (95% CI)[a] [5] 2016	Alcohol per capita L [95% CI][b] [5] 2019	Diabetes %[c] [9] 2021	Life expectancy at birth % [10] 2022	Universal health coverage % [d] 2021	Health spending as % of gross domestic product % [e] 2020	Gini coefficient [10] 2019–2023
Argentina	35.4 (32.6–38.2)	41.6 (33.6–50.0)	8.0 (5.6–10.7)	5.4	76	75	10.0	40.7
Bolivia	28.7 (25.4–32.1)	–	4.1 (2.1–6.2)	5.5	65	65	7.9	40.9
Brazil	28.1 (25.7–30.6)	47.0 (38.9–55.3)	7.7 (5.1–10.4)	8.8	73	80	10.3	52.0
Chile	38.9 (34.8–43.0)	26.6 (19.6–33.6)	6.7 (4.6–9.2)	10.8	80	82	9.8	43.0
Colombia	23.6 (21.1–26.2)	44.0 (35.4–52.7)	4.9 (2.9–7.1)	8.3	74	80	9.0	54.8
Costa Rica	31.4 (27.3–35.8)	46.1 (37.9–54.4)	3.5 (1.8–5.3)	8.8	77	81	7.9	47.2
Cuba	21.8 (19.0–24.7)	36.9 (29.2–45.2)	6.0 (3.5–8.5)	7.6	78	83	12.5	–
Dominican Republic	29.3 (25.7–33.1)	39.0 (30.9–47.7)	6.8 (4.3–9.3)	10.5	74	77	4.9	37.0
Ecuador	27.4 (24.6–30.0)	27.2 (19.7–34.6)	3.3 (1.7–5.0)	4.4	78	77	8.5	45.5
El Salvador	30.9 (26.6–35.4)	–	3.3 (1.6–4.9)	6.3	71	78	9.8	38.8
Guatemala	26.8 (23.5–30.3)	37.1 (27.9–47.4)	1.6 (0.5–2.7)	13.1	69	59	6.5	–
Honduras	29.5 (23.3–36.5)	–	3.2 (1.6–5.0)	5.1	71	64	9.0	48.2
Mexico	36.0 (34.4–37.7)	28.9 (23.0–35.6)	5.7 (3.2–8.2)	16.9	75	75	6.2	43.5
Nicaragua	33.6 (27.3–40.3)	–	4.2 (2.4–6.0)	9.3	75	70	8.6	–
Panama	36.1 (32.7–39.6)	–	6.6 (4.4–8.9)	8.2	77	78	9.7	48.9
Paraguay	33.0 (27.1–39.0)	37.4 (28.9–45.9)	5.6 (3.5–7.9)	7.5	70	72	7.6	45.1
Peru	27.3 (25.9–28.7)	–	7.5 (4.7–10.2)	4.8	73	71	6.3	40.3
Uruguay	33.3 (28.3–38.6)	22.4 (16.9–29.0)	5.5 (3.4–7.6)	9.0	78	82	9.2	40.6
Venezuela	22.7 (19.8–25.7)	31.4 (24.0–40.0)	3.0 (1.5–4.7)	9.6	71	75	3.8	–––

CI, confidence interval.
[a]Among adults aged ≥18 years (age standardized).
[b]Among individuals aged ≥15 years (age standardized).
[c]Among adults aged 20–79 years (age standardized).
[d]Available at: https://diabetesatlas.org/data/en/indicators/2/.
[e]Available at: https://data.worldbank.org/indicator/.

hypertension [24]. A recent study from Colombia has demonstrated that isometric exercise in hypertensive patients has a considerable BP-lowering effect with an average reduction of 9 mmHg in SBP with only 20 min of exercise three times a week [25]. This is important because individuals with lower strength have adverse cardiometabolic characteristics and increased all-cause mortality, cardiovascular death, and higher fatality rates after an acute illness independently of demographic, anthropometric, or classic CVRF [26–28].

LATAM is a large region with great disparities regarding climate, altitude of residence, diet, ethnicity, socioeconomic characteristics, and life expectancy. A study carried out in Brazil showed that BP values may be dependent on environmental temperature, with higher rates of sustained hypertension in colder regions, and higher rates of normotension and in warmer regions [29]. As mentioned above, another relatively new variable to consider is environmental pollution, which is an important problem, especially in countries such as Chile and Perú, because of its association with a rise in BP [30]. The influence of altitude of residence on BP levels and cardiovascular risk is an issue still only partly explored, despite more than 32 million people living at an altitude higher than 2500 m in LATAM. These people are chronically exposed to hypobaric hypoxia which favour a BP increase (see section 'Hypertension in Andean, high-altitude population') [31].

Some countries have a very old population, with thus a higher prevalence of hypertension. Races and ethnicities in LATAM are also diverse [1,20] ranging from white, black, mestizo, indigenous, mulatto, and zambo individuals. It is well known that the black population is characterized by a higher prevalence of hypertension, a greater incidence of hypertension-related complications and a more difficult BP control, and blacks are a considerable fraction of the general population in several LATAM countries. Notably, socioeconomic determinants play an important role in the general population but particularly in the Afro-descendants and the indigenous [15].

DEFINITION OF HYPERTENSION, CLASSIFICATION, DIAGNOSIS, AND GLOBAL RISK STRATIFICATION

Definition and classification of hypertension

According to the previous 2017 LASH guidelines, and current international guidelines, definition of hypertension is based on repeated office SBP values at least 140 mmHg and/or DBP at least 90 mmHg. This arbitrary definition refers to the level of BP at which the benefits of intervention (lifestyle interventions or drug treatment) exceed those of not intervention, as shown by outcome-based randomized controlled trials (RCTs). Current evidence continues to support these office BP thresholds for the definition of hypertension in the general population, which thus remains to unchanged from the previous guidelines [1,2,32]. The classification of office BP and definition of hypertension grades also remain the same from previous guidelines with incorporation of isolated systolic and isolated diastolic hypertension (Table 3).

TABLE 3. Blood pressure classification

Category	Systolic (mmHg)		Diastolic (mmHg)
Optimal	<120	and	<80
Normal	120–129	and	80–84
High-normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension	≥140	and	<90
Isolated diastolic hypertension	<140	and	≥90

Blood pressure measurement and monitoring

Office blood pressure measurements

Accurate office BP measurement is the cornerstone of the diagnosis and effectiveness of BP-lowering treatment. However, given that BP is intrinsically characterized by continuous changes over time and is importantly affected by the continuous interaction between its regulatory mechanisms and environmental stimulations, its assessment should be based on the combination between repeated and standardized BP measurements in the office and BP measurement taken out of the office, in daily-life conditions [33–36]. Conventional BP measurement in the office (OBPM) or in a screening setting is the most well studied method for assessing BP and the one by which the diagnosis of hypertension, classification of BP, and the BP thresholds and targets of therapeutic interventions have been established [2,37,38]. Despite its limitations, which have led to increasing use of out-of-office BP measurements, standardized OBPM remains the main method for hypertension diagnosis and management recommended by current International Guidelines and is also the most widely used in LATAM. Figure 2 summarizes the methodology for accurate OBPM.

Ambulatory and home blood pressure monitoring

Both out-of-office BP measurement approaches, home BP monitoring (HBPM) and 24 h ambulatory BP monitoring (ABPM) have shown to be better predictors of cardiovascular morbidity and mortality than OBPM. Beyond their greater predictive power, HBPM and ABPM can substantially refine conventional OBPM-based risk stratification, particularly in patients with OBPM defined grade 1 and 2 hypertension [36,38–40].

ABPM is superior to other BP measurement techniques in demonstrating the efficacy of antihypertensive therapy in covering the whole 24 h, including the night. ABPM, as well as HBPM, can also identify individuals with masked hypertension, that is, normal BP in the office but elevated BP in daily life, a condition that has been shown to carry an adverse prognosis close to that of sustained hypertension (BP elevation both in the office and in daily life). ABPM and HBPM are the most effective techniques for identifying white-coat hypertension (WCH), also called 'isolated office BP elevation' (BP elevation in the office but not in daily life), which may be present in approximately one-third or

Recommendations	Class	Level
Office BP is recommended for diagnosis of hypertension. These measurements must be performed using a standard protocol with three measurements separate by 1-2 minutes, after 5 minutes of rest. The average of the last two measurements should be referred to as the office value.	I	A
It is recommended to diagnose hypertension during at least 2 separate office visits (within 4 weeks) unless office BP indicates grade 3 hypertension (≥180/110 mmHg) or there is evidence of HMOD or CVD.	I	C
At the first visit, BP must be measured in both arms. Finding of a between-arm SBP difference >15-20 mmHg suggests atheromatous disease and is associated with increased CV risk. All subsequent measurements should be made on the arm with the highest BP readings.	I	C
Out-of-office BP is a source of important information for diagnostic and therapeutic purposes. It is therefore recommended to obtain additional information on BP values by ABPM or HBPM or both, if available.	I	C

FIGURE 2 Recommendations for office blood pressure measurement. Modified from reference [4].

more of patients with an office BP elevation. WCH is associated with a greater cardiovascular risk and a HMOD prevalence, which are greater than those of normotension but less than those of sustained hypertension. Unfortunately, no trial has specifically addressed the effect of antihypertensive treatment on cardiovascular outcomes in the masked hypertension and WCH phenotypes [2,34,38,40].

Night-time hypertension is defined as an average BP at least 120/70 mmHg recorded during the night hours with ABPM. In recent years, some home BP devices have emerged as a new method for obtaining BP values during sleep, and they could be a useful alternative to ABPM in low-income and medium-income countries in LATAM. Night-time BP has proven to be more predictive of adverse outcomes, including cardiovascular events and mortality, than daytime or even 24 h BP [2,38]. Even patients with nocturnal hypertension and normal office BP and daytime BP, a condition called 'isolated nocturnal hypertension', exhibit a higher risk of HMOD and adverse outcomes. Selective treatment of nocturnal hypertension is not available, and no solid evidence exists on the effects of reducing nocturnal BP values on outcomes in nondippers or reverse-dippers [2,38]. Although several therapeutic strategies have been proposed to achieve this goal with bedtime administration of antihypertensive medications, the so-called chronotherapeutic approach, recent evidence shows that bedtime drug administration did not lead to any difference in cardiovascular outcomes compared with morning administration (the latter associated with a better adherence to treatment) [2].

One important issue in LATAM is that each country has its own national regulatory agency for validation of medical devices. A uniform policy across LATAM countries for the use of the same international validation protocol, should contribute to reduce the use of inaccurate BP monitors in the market. A list of validated devices should be available on the website of national Latin American hypertension societies, to facilitate a proper choice by clinicians [38,40]. HBPM is less costly and highly available in many clinical settings of LATAM and may be a better out-of-office standard procedure than ABPM [40]. Table 4 summarizes the indications for HBPM and ABPM.

Telemonitoring, telemedicine, and hypertension

A survey carried out by cardiology and hypertension societies of the Americas in 1753 physicians showed that 48.9% had a high interest in using remote telemonitoring in their

TABLE 4. Clinical indications for home blood pressure monitoring and ambulatory blood pressure monitoring

Common indications of HBPM and ABPM
Diagnosis of WCH and MH in untreated individuals and of corresponding phenotypes in treated patients
Confirmation of true resistant hypertension
Evaluation of 24 h BP control in treated patients
Evaluation of hypotension symptoms in treated patients
Interpretation of exaggerated BP response to exercise
Considerable day-to-day BP variability in office measurements
Specific indications for ABPM rather than HBPM
Assessment of nocturnal BP and dipping status which are frequent in patients suffering sleep apnoea, diabetes, CKD, secondary hypertension, autonomic dysfunction).
Patients incapable or unwilling to perform reliable HBPM, or anxious with self-measurement
Pregnancy (with ad hoc validated devices)
Specific indications for HBPM rather than ABPM
Long-term follow-up of treated individuals to assess BP control and favour patients' adherence to prescribed treatment
Patients unwilling to perform ABPM, or with considerable discomfort during the 24h recording

ABPM, ambulatory blood pressure monitoring; CKD, chronic kidney disease; HBPM, home blood pressure monitoring; MH, masked hypertension; WCH, white-coat hypertension.

clinical routine, whereas 43.6% were currently using telemonitoring [40]. The combined use of out-of-office BP measurements and telemedicine tools has been shown to represent a helpful approach to keep patients and physicians in contact and to promote better patients' adherence to treatment and improved BP control.

Barriers to implementation of telemedicine services in LATAM such as lack of telehealth licences, patient privacy and confidentiality issues, data accuracy and misdiagnosis, provider–patient relationship conditions, medical responsibilities, risk of fraud and abuse, treatment prescriptions, and reimbursement determination, must be considered [41]. In addition, some patients may feel more emotionally involved and satisfied with office visits, which may help to develop a better patient–physician relationship, challenging personal connections, and the ability to examine the patient when needed [42]. It is in any case acknowledged that telemonitoring and virtual visits should not substitute but rather complement conventional in-presence visits.

Artificial intelligence

The use of artificial intelligence applications holds the potential to promote personalized medicine and tailored treatment for the individual patient. Furthermore, thanks to specific algorithms, artificial intelligence has been implemented in studies aimed at identifying new genes for the early diagnosis of hypertension and the prevention of its complications [43]. Artificial intelligence-based systems are also currently used to develop novel BP monitoring technologies, based on wearable sensors, either in case of cuff-based devices (such as volume-clamp devices or wrist-worn inflatable cuffs) and of cuffless devices that use mechanical and optical sensors to determine features of the blood pulse waveform shape, such as tonometry, photoplethysmography, and capacitance, to estimate BP [44,45]. Artificial intelligence could help to improve precision, accuracy, and reproducibility in diagnosing and managing hypertension using these emerging wearables or cuffless technologies. Artificial intelligence-based systems have the potential to improve clinical practice for hypertension by identifying patient trajectories for new, personalized care plans, and predicting patients' risks and necessary therapy adjustments due to changes in disease progression and/or therapy response [45].

Clinical evaluation and search for hypertension-related subclinical organ damage

Medical history, physical examination, and basic laboratory tests

The work-up required to obtain the information in patients with suspected or established hypertension was accurately described by previous guidelines [1,2]. Except for subclinical organ measures of HMOD, they have not changed substantially in the last years and will thus be reported in the present guidelines only in Table 5, apart from HMOD, which deserves a more detailed description.

TABLE 5. Routine examination protocol for patients with hypertension

Medical history
Time of the first diagnosis of hypertension, including records of any previous medical screening, hospitalizations
Recordings of current and past BP values by self-BP measurements.
Long-term stable or rapidly increasing BP
Current/past antihypertensive medications including their effectiveness and intolerance. Assess adherence to therapy
Previous hypertension in pregnancy/preeclampsia
Patient's CVRF
Family history of hypertension, CVD, stroke or CKD
Smoking
Diet, salt and alcohol consumption
Regular physical exercise vs. sedentarism. Weight gain or loss
Sleep history, snoring, sleep apnoea (information also from partner)
Sexual dysfunction in men and women
Resting heart rate >80 bpm
Distress with job or at home (subjective stress level)
History and symptoms of HMOD, CVD, stroke and kidney disease
SNS: headache, vertigo, syncope, impaired vision, TIA, sensory or motor deficit, stroke, carotid revascularization, memory loss and dementia in older people
Heart: chest pain, shortness of breath, oedema, MI, syncope, HF, coronary revascularization, history of palpitations, arrhythmias (especially AF)
Kidney: thirst, polyuria, nocturia, haematuria, urinary tract infections
Peripheral arteries: intermittent claudication, cold extremities, pain-free walking distance, pain at rest, ulcer or necrosis, peripheral revascularization
Patient or family history of CKD (e.g. polycystic kidney disease)
Symptoms and signs of possible secondary hypertension
Young onset of grade 2 or 3 hypertension (<40 years), or sudden development of hypertension or rapidly worsening BP in older patients
History of repetitive renal/urinary tract disease
Episodes of sweating, headache, anxiety or palpitations, suggestive of pheochromocytoma
History of spontaneous hypokalaemia (or under diuretic therapy), episodes of muscle weakness and tetany (hyperaldosteronism)
Symptoms and signs suggestive of thyroid disease or hyperparathyroidism
Current pregnancy, postmenopausal status and oral contraceptive use or hormonal substitution
Medications, substances, recreational drugs use
Antihypertensive drugs previously used
Recreational drugs (cocaine), substance abuse (liquorice), concurrent therapies including glucocorticoids, NSAIDs/COX-2 inhibitors, paracetamol, immunosuppressive and anticancer drugs, nasal vasoconstrictors
Physical examination protocol
Office BP and resting heart rate (see Figure 2)
Weight and height with calculation of BMI. Waist circumference
Search for signs of HMOD
Auscultation of heart and carotid arteries
Palpation of carotid and peripheral arteries
Ankle–brachial index
Neurological examination and cognitive status
Fundoscopic examination for hypertensive retinopathy in emergencies
Search for signs of secondary hypertension
Cafe-au-lait skin patches of neurofibromatosis (pheochromocytoma)
Abdominal palpation for signs of renal enlargement in polycystic kidney disease
Signs of Cushing's disease or acromegaly
Signs of thyroid disease
Auscultation of heart and renal arteries for murmurs or bruits indicative of aortic coarctation, or renovascular hypertension
Standard laboratory tests for all patients with hypertension
Haemoglobin and/or haematocrit
Fasting blood glucose and HbA1c
Serum lipids: total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides
Serum sodium and potassium
Serum creatinine (and/or cystatin C) for estimating GFR
Serum uric acid
Serum calcium
Analysis of first voided urine in the morning: dipstick test in all patients; urinary albumin/creatinine ratio and microscopic examination in selected

BP, blood pressure; CKD, chronic kidney disease; CVD, cardiovascular disease; HF, heart failure; HMOD, hypertension-mediated organ damage; MI, myocardial infarction; TIA, transient ischemic attack.

Methods of clinical evaluation

Subclinical organ damage refers to early-stage injury to organs that occurs without obvious symptoms in the heart, kidneys, brain, and blood vessels. Its clinical importance relies on the fact that there is strong evidence that subclinical organ damage predicts the risk of clinically overt cardiovascular outcomes. There is also evidence that BP-lowering treatment may reduce organ damage, and that this reduction may be associated with a reduction of cardiovascular morbid and fatal outcomes [2]. Early identification of organ damage can help in preventing progression to more severe conditions and thus this guideline underscores the importance of regular screening for hypertension-mediated organ damage (HMOD).

Evaluating HMOD involves BP follow-up, electrocardiograms (ECGs), laboratory tests, imaging studies, arterial stiffness assessments, and the ankle–brachial index (ABI) test for PAD. This evaluation helps in assessing the extent of organ involvement and as guidance of treatment. It is crucial to consider the patient's history of hypertension, previous CVD, antihypertensive medication use, and comorbid conditions (e.g. diabetes, obesity, dyslipidaemias) during evaluation, as these factors influence risk and treatment decisions. Early detection of structural damage is key to prevent or delay HMOD progression [2,46].

Cardiovascular impact of hypertension

Hypertension induces structural changes in the heart, including left ventricular hypertrophy (LVH). LVH can be detected through electrocardiography, echocardiography, and cardiac MRI, being the latter the gold standard for assessing cardiac structure and function [46].

Conditions such as hypertensive cardiomyopathy, heart failure with preserved ejection fraction (HFpEF), atrial fibrillation, valvular heart disease, aortic syndromes, PAD, CKD, dementia, and erectile dysfunction are associated with structural damage [47]. Early BP control is recommended to prevent progression and associated complications, and monitoring abnormalities with clinical and laboratory tests is essential, regardless BP levels (Table 6).

Cardiac organ damage assessment

LVH is a common HMOD, increasing the risk of heart failure, sudden death, angina, MI, and cerebrovascular disease [48,49]. ECG is recommended as the primary tool for diagnosing hypertensive LVH [50], and the Sokolow and Murphy criteria are commonly used [51–53]. Transthoracic echocardiogram (TTE) is more sensitive than ECG for identifying hypertensive LVH, providing detailed information for antihypertensive therapy [54]. 2D-TTE is an affordable tool for real-time assessment of LV mass, LV geometry, left atrial dimensions, aortic root size, and LV diastolic and systolic dysfunction [55]. Patients with nondilated concentric LVH have a higher risk of cardiovascular events, especially with LV enlargement. Regression of LVH with antihypertensive medication reduces cardiovascular risk, though it may not improve LV diastolic dysfunction [55]. Hypertension also affects left atrium causing dilatation and higher risk of atrial fibrillation due to increased LV filling pressure.

Renal damage assessment

Albuminuria is an early sign of kidney damage, detectable through a morning urine test, and its persistence over 3 months indicates renal damage and endothelial dysfunction, predicting cardiovascular events and mortality [56]. Albuminuria is categorized as normal A1 if albumin/creatinine ratio (ACR) less than 30 mg/g. Increased urinary ACR (UACR) signals glomerular filtration barrier disruption. Albuminuria category A2 (30–299 mg/g) formerly called microalbuminuria indicates preclinical disease, whereas severely increased albuminuria A3 (>300 mg/g), formerly called overt proteinuria, indicates established renal disease [46,57–59].

Although serum creatinine alone is not a reliable marker for detecting early renal impairment, estimation of GFR (eGFR) using the CKD-EPI equation provides a more comprehensive evaluation of kidney performance [60]. This estimation helps identify kidney dysfunction at an earlier stage, guiding appropriate management and intervention to prevent progression to CKD. The use of an estimating equation for initial assessment of eGFR is recommended. Cystatin C detects early renal function changes and is useful for identifying initial deterioration and predicting progression to CKD [61]. Cystatin C measurement is recommended in clinical situations where eGFR equation is less accurate such as malnutrition, vegetarian diets, keto-diets, class III obesity, cancer, heart failure, cirrhosis, catabolic states, use of steroids, and use of broad-spectrum antibiotics. Renal ultrasound is effective for assessing HMOD, providing details on kidney size, structure, and stones, is cost-effective and noninvasive [62]. Doppler ultrasound evaluates the renovascular system, assessing peak systolic velocity (PSV) and renal resistance index (RRI) to detect renal artery stenosis [63].

Early indicators of atherosclerosis

Hypertension causes vascular changes due to endothelial dysfunction and arteriolar remodelling, initially manifesting as increased intima–media thickness (IMT) or small atheromatous plaques. Carotid IMT (cIMT) is an early atherosclerosis marker that predicts cardiovascular risk. Assessed via carotid ultrasound is considered abnormal when greater than 0.9 mm, although this varies by age [64–66]. The evaluation of cIMT for global cardiovascular risk quantification have less impact than the presence of carotid plaques, but recent evidence is in favour of its contribution to the risk, and antihypertensive treatment may reduce cIMT [2]. Carotid plaques are identified with a cIMT of at least 1.5 mm or a focal thickness increase of 0.5 mm or 50% of surrounding cIMT and have a predictive value for both stroke and MI, independent of other CVRF and risk scores predicting stroke and MI [67,68].

The PESA study revealed a high prevalence of subclinical atherosclerosis in apparently healthy middle-aged individuals, with 63% having plaques in various arteries. Subclinical atherosclerosis is more common in noncoronary arteries, with varying prevalence among genders [69]. A recent study showed 35% of women and 56% of men had carotid plaques, and 90% of women and 85% of men had abdominal aorta plaques [64].

TABLE 6. Assessment of hypertension-mediated organ damage

Category	Test/method	Purpose	Details
Office and out-of-office BP measurements	BP measurement	Routine monitoring to assess and manage hypertension	Regular follow-up to evaluate treatment efficacy and adjust management
Cardiac assessment	Electrocardiogram (ECG)	Detection of LVH and other cardiac changes	Primary tool for diagnosing LVH.
	Echocardiography (transthoracic, 2D-TTE)	Assesses LV mass, geometry, and LV dysfunction	More sensitive than ECG for identifying LVH; provides detailed information of cardiac structure.
	Cardiac MRI	Provides detailed cardiac structure and function assessment	Gold standard for evaluating cardiac structure and function
Renal assessment	Urinary albumin/creatinine ratio	Detects early signs of renal damage (albuminuria)	Measures protein levels to assess kidney function; categorized as normal (A1) to moderately increased (A2), or severely increased (A3)
	Serum creatinine	Assesses kidney function	Can be affected by various factors. Not always reliable for early renal impairment
	Estimation of the glomerular filtration rate by CKD-EPI	Provides a comprehensive assessment of kidney function	eGFR based on serum creatinine levels helps identify early renal impairment and guide management.
	Cystatin C	Detects early renal function changes	Useful for identifying initial deterioration and predicting progression to chronic kidney disease.
	Renal ultrasound	Evaluates kidney size, structure, and stones	Noninvasive, cost-effective; assesses hypertension-mediated organ damage
	Doppler ultrasound	Assesses renovascular system, peak systolic velocity (PSV), and renal resistance index (RRI)	Detects renal artery stenosis
Vascular assessment	Carotid intima–media thickness (cIMT)	Early marker of atherosclerosis	Measured via carotid ultrasound; abnormal if >0.9 mm.
	Carotid plaque assessment	Identifies carotid plaques; predicts stroke and myocardial infarction	Assessed with cIMT measurements; plaques indicate increased cardiovascular risk.
	Pulse wave velocity (PWV)	Estimates arterial stiffness	cfPWV is a key marker for vascular ageing and predicting future cardiovascular events
	Ankle–brachial index (ABI) Test	Assesses peripheral artery disease (PAD)	Compares BP in the ankle with the BP in the arm; helps evaluate blood flow to the legs.
	Retina microvasculature assessment	Detects retinal microvascular changes associated with hypertension and DM-2	Evaluates retinal vessel health; abnormalities may indicate systemic vascular impairment.
Neurological assessment	Brain imaging (CT, MRI)	Detects silent structural brain damage	Identifies WML, lacunar infarcts, and MBs associated with hypertension.
	Cognitive function tests (MoCA, MMSE)	Detects cognitive impairment	Identifies individuals with high risk for dementia

CKD-EPI, Chronic Kidney Disease Epidemiology Collaboration equation; CT, computed tomography; LVH, left ventricular hypertrophy; MMSE, Mini Mental State Examination; MoCA, Montreal Cognitive Assessment.

Pulse wave velocity

Age or prolonged exposure to hypertension leads to arterial stiffening, manifested by changes in the arterial media layer, such as elastin fragmentation and calcification [70]. PWV, especially carotid–femoral PWV (cfPWV), assesses regional arterial stiffness from the aortic arch to the femoral artery. It predicts future cardiovascular events and is a marker of vascular aging [71]. Measuring cfPWV helps identify high-risk individuals and manage CVRF [72]. PWV can also be measured using MRI or Doppler echocardiography, with artificial intelligence potentially enhancing these methods [73]. In hypertensive patients, PWV predicts survival and helps monitoring treatment response and prognosis [74].

Neurological implications of hypertension: silent brain damage and cognitive dysfunction

Hypertension significantly increases the risk of stroke and cognitive decline. Elevated BP damages cerebral microvasculature, leading to white matter lesions (WML), lacunar infarcts, and microbleeds, markers of brain damage detectable via MRI. These changes can impair cognitive functions like memory, attention, and executive function. Early detection and treatment of hypertension can preserve cognitive function and prevent cognitive disorders related to high BP [75–77]. Treated and controlled hypertensive patients show fewer WML compared with untreated or poorly controlled patients, underscoring the importance of early detection and treatment in preventing stroke and cognitive impairment [46].

TREATMENT OF HYPERTENSION

Lifestyle changes

Healthy lifestyles reduce the lifetime risk of developing hypertension, have a BP-lowering effect and is associated with a reduction of the global cardiovascular risk. Its implementation is recommended for the whole population, and mandatory for patients with hypertension. Lifestyle measures have n updated in the more recent guidelines and are widely accepted [2,78,79]. Implementation of these lifestyle measures must be adapted to the characteristics of the Latin American population.

Reduction of sodium intake

All guidelines agree that a reduction of salt intake to less than 5 g/day is recommended for all hypertensive patients [2,78,79]. A pragmatic recommendation is to reduce salt intake at least to less than 7 g per day.

Adequation of potassium intake

Increased potassium intake, mainly from diet, is beneficial for the prevention and control of elevated BP and stroke, and partial substitution (25%) of sodium by potassium in salt reduce MACE and death. Potassium-rich diets (DASH or Mediterranean diets) are preferred than potassium supplementation pills [80,81].

Weight control

Prevalence of obesity in LATAM is at least 23% and overweight 40.6% and are associated with hypertension [82]. Abdominal obesity, defined for LATAM as cut-off points of abdominal perimeter of 89 cm in men and 86 cm in women, is associated with MACE and incident diabetes in the region [83]. Each kilogram of weight reduction is associated with 1 mmHg lowering in BP, and intentional weight loss is associated with about 15% reduction in all-cause mortality [84]. Maintaining weight reduction in the long-term is very difficult and advice for food intake, exercise programs and habits must be tailored to each patient, with possible participation of other health professionals [85]. New GLP-1 receptor agonists reduce body weight effectively in diabetic and nondiabetic patients [86]. In severe obese, use of bariatric surgery is an alternative [87].

Regular physical activity and exercise

People meeting the WHO-recommended exercise target showed lower BP compared with those who did not in the May Month of Measure 2021 campaign carried out in 642 057 individuals, including 156 513 from America, most of them from LATAM [88]. Regular dynamic and static (isometric) exercise is associated with important BP and CVD reduction. Lowering BP with regular aerobic exercise is 2–4 mmHg in normotensives and 5–8 mmHg in hypertensive patients, and regular exercise is also beneficial for lipid and glucose control [88].

Moderation of alcohol consumption

There is a close association between alcohol intake, BP elevation, and mortality, with heavy drinkers having the highest prevalence of hypertension and mortality rate. Some observational studies suggest that light drinkers may have a reduced cardiovascular mortality compared with teetotallers but the existence of a 'J' curve relationship between alcohol consumption and cardiovascular outcomes is controversial. An excessive alcohol intake is the most important risk factor for haemorrhagic stroke, and advice to start alcohol intake in teetotallers is never recommended [2,79]. Several RCTs have shown that a reduction in alcohol intake to less than two drinks per day lowers BP in a dose–response manner [89].

Cessation of smoking habits

Prevalence of smokers in LATAM is still high ranging from 22 to 45% (https://cdn.who.int docs whs2023_annex1). In addition, chewing tobacco leaves or some special preparation of tobacco paste bars known as 'chimó' are consumed in countries like Venezuela and Colombia [90,91]. Nicotine is also present in vaping (e-cigarettes) the use of which is increasing. Tobacco use increases ambulatory BP, BP variability, and CVD, and may reduce the effect of antihypertensive treatment. CVD increase even in passive smokers [2,82].

Healthy diets

DASH diet is a low caloric diet based on grains, fruits, vegetables, low fat content, and high potassium, calcium, magnesium, and fibre content. Mediterranean diet ingredients are vegetables, fruits, nuts, beans, whole grains or cereals, moderate amounts of dairy, poultry, eggs, seafood, and olive oil. Both reduce BP and CVD mortality [2]. However, these diets must be adapted to local products of different countries in LATAM. Regular inclusion of moderate intake of coffee, tea, yerba mate, guarana, or chocolate is acceptable without important effect on BP [92]. A recent longitudinal study in 1408 individuals from the PAMELA study, followed for a period of 10 years have shown that habitual coffee consumption is associated with neutral effects on in-office and out-of-office BP values [93].

Other measures

Methods reducing stress such as meditation yoga or mindfulness may be useful to reduce BP, although evidence of the beneficial effects in the long-term is weak. Ambient noise in some LATAM cities impact negatively on cardiovascular health, particularly in specific jobs [11]. Environmental air pollutants such as volatile organic compounds and nanoparticles less than 2.5 μm in diameter ($PM_{2.5}$) are also related with CVD [94,95]. Hypertensive patients should avoid areas with noise and air pollution or use appropriate devices to minimize their impact. Healthy lifestyle recommendations are summarized in Figure 3.

Pharmacological treatment

The aim of antihypertensive treatment is not simply to reduce BP values but to prevent premature death by avoiding, delaying, or limiting hypertension-related complications. To achieve this objective, treatment must be managed with lifestyle modifications and adequate and permanent use of antihypertensive medications. Pharmacological treatment must be:

1. **Timely:** treatment should be started as soon as the diagnosis of hypertension has been adequately completed.
2. **Effective and sustained over time:** patients should be maintained for at least 70% of their remaining life at BP levels of at least less than 140/90 mmHg, and preferably close to 130/80 mmHg, without reaching levels lower than 120/70 mmHg. It is recommended to reach levels below 130/80 mmHg in patients who have clinical CVD or who are at high cardiovascular risk: patients with DM-2, those who have more than three associated CVRF or those who have HMOD. There is no clear evidence that achieving these lower BP levels are more protective in patients over 80 years, in those with ISH, in patients with advanced CKD or with LVH. In these patients BP, targets must be personalized.

Recommendations	Class	Level
Reduction in salt intake < 7 g per day (equivalent to 3 g of sodium).	I	A
Increase potassium content in diet except in CKD (stage IV or V).	I	B
Reduce weight in obesity or overweight.	I	A
Practice daily physical activity of at least 150 to 300 minutes per week of dynamic (aerobic) exercise of moderate intensity, or half of this time if aerobic exercise is of high intensity. Dynamic resistance exercise 2-3 times per week is also recommended.	I	B
Reduce sedentary time.	I	B
Moderate alcohol intake in a maximum of 1 or 2 drinks per day (10 g alcohol/standard drink) and implement alcohol-free days during the week in individuals consuming alcoholic beverages.	I	B
Teetotallers should never start alcohol intake for CV prevention.	III	B
Avoid heavy (binge) alcohol drinking due to the risk of haemorrhagic stroke.	III	B
Avoid active and passive smoking tobacco and water pipe smoking or vaping.	I	B
Adopt healthy diets (Mediterranean or DASH) if feasible, adapted to local foods.	I	B
Avoid air pollution and noise or using appropriate devices to minimize exposition when possible.	II	C
Reduce stress and anxiety by means of meditation and breathing control (yoga techniques).	II	C

FIGURE 3 Healthy lifestyle recommendations

Adequate adherence and treatment persistence (at least more than 70% of the overall prescription time), regardless of the type of antihypertensive drugs chosen, ensure a reduction in the risk of suffering MACE between 10 and 25%, while treatment discontinuation may lead to an about 40% increase of cardiovascular risk [2]. Physicians' inertia (not starting treatment in a timely manner, not adjusting treatment to timely achieve targets, interrupting treatment, not convincing patients about the importance of adherence and persistence to reduce morbidity and mortality, not empowering the patient and their family in the knowledge of the disease), is responsible for more than 50% of the failure of treatment [2].

3. **Expedite:** BP targets should ideally be achieved within 3 months.
4. **Integral:** the optimal control of the patient with hypertension also includes the achievement and maintenance of targets of the associated CVRF (overweight/obesity, lipid levels, glucose levels, albuminuria, etc).

When to initiate pharmacological treatment

Implementation of lifestyle changes alone without antihypertensive medications is justified only in people with BP higher than 120/80 mmHg, that is, even if its BP is below the levels of grade 1 hypertension (Fig. 4). The correct approach to lifestyle changes is promoting their implementation, which often requires a multidisciplinary team of nurses, psychologists, nutritionists, and physical trainers. For patients with grade 1 and low risk, lifestyle modifications without medications could be attempted for a period of about 3 months. It is recommended to initiate simultaneously lifestyle modifications and antihypertensive medications in most patients [2].

Current evidence does not support initiation of antihypertensive treatment in people with high-normal BP and low cardiovascular risk. However, in patients with a very high cardiovascular risk with established CVD (mainly myocardial infarction), several meta-analyses have shown a reduced risk of MACE with a few mmHg SBP reduction. Thus, treatment of people with high-normal BP and established CVD, especially CAD, is recommended [2].

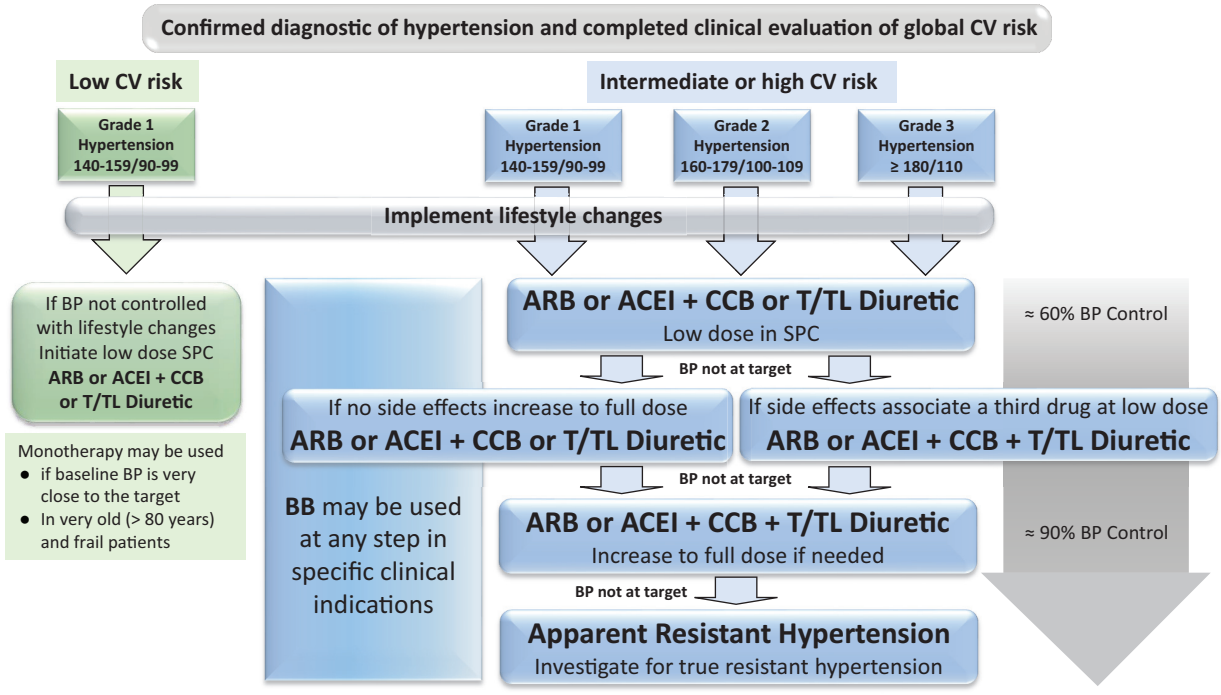

FIGURE 4 When and how to initiate antihypertensive treatment.

How to initiate pharmacological treatment

These guidelines strongly recommend that the first step of treatment should be the use of the combination of two antihypertensive drugs in a single pill (SPC) at low doses in most patients. This recommendation is based on the proven benefit of this approach, namely improvement of adherence, reduction of therapeutic inertia, shortening of the titration phase, and reduction of MACE compared with an initial treatment strategy based on monotherapy. Preference to SPC rather than separate drug administration is supported by the multiple evidence that treatment simplification is associated with a marked increase of adherence to treatment and a related reduction of events independently of the drugs included in the single pill [2]. The current widespread use of monotherapy in LATAM is no longer recommended.

If low-dose dual SPC is not sufficient to achieve BP control, physicians may increase the dose of the same components (full-dose SPC) or change the components of the initial dual combination. This decision will depend on the amount of the BP reduction achieved with the low-dose SPC and/or presence of side effects.

The second step would be to use a triple SPC of different antihypertensive classes [96]. It is imperative for LATAM a universal availability and accessibility of antihypertensive drugs in SPC for medical prescription in the first and second steps: Dual SPC at low doses and full doses of different combinations (ARBs or ACEIs + DH-CCBs; ARBs or ACEI + thiazide or thiazide-like diuretics); and triple SPC of ARBs or ACEIs + DH-CCBs + thiazide or thiazide-like diuretics (Fig. 2).

Monotherapy should be only prescribed at the second and third levels of medical care, intended only for the first step of treatment in patients who meet the requirements of frailty (Figure 5). Efficacy and safety of BP targets less than 130/80 mmHg to be achieved in most patients is well supported but BP levels less than 120/70 mmHg should never be a target because of high risk of increased side effects, treatment discontinuation, and orthostatic hypotension [2,97,98]. To ensure that BP targets are achieved, ABPM or HBPM measurements are recommended.

Why do not initiate with monotherapy in all patients?

The widespread use of monotherapy in the world, reaching 70% in LATAM, as the main strategy to treat hypertensive patients explains in part the insufficient BP control achieved so far, even with adequate adherence and persistence on the strategy [99]. The fact of not reaching targets in monotherapy and medical inertia makes imperative to explain LATAM physicians why monotherapy must not be the routine of antihypertensive treatment but rather an exception. When combination therapy is chosen, fixed-dose SPC should be used whenever possible, as they are associated with greater adherence to treatment.

Why initiate with combination therapy in most patients?

The expected decrease in BP values with a single drug – monotherapy – from any of the known drug classes even at their maximum recommended doses ranges between 8 and 12 mmHg for SBP, and 5–8 mmHg for DBP [100]. For this reason, even in patients with mild BP elevations is very difficult to reach the therapeutic targets with this strategy, and BP targets are only achieved in about 20–30% of patients treated in monotherapy regardless the drug class

Recommendations	Class	Level
Pharmacological treatment should be initiated immediately after a correct diagnostic of HT and basic clinical evaluation.	I	A
Patients should be maintained for life at BP levels < 140/90 mmHg, and preferably < 130/80 mmHg if treatment is tolerated.	I	A
BP levels < 120/70 mmHg should never be a target	III	A
Treatment strategy must be personalized in very old frail patients, patients with ISH and IDH, and with advanced CKD.	I	B
BP targets should be ideally achieved in three months and accompanied of the adequate control of the associated CV risk factors.	I	B
Initiate treatment with a combination of two antihypertensive drugs at low doses in most patients. If low dose is not enough to achieve BP control, increase the dose of the same components or add a third drug.	I	A
Dual combination of ARBs or ACEIs plus DH-CCBs or HCTZ (or thiazide-like chlortalidone or indapamide) is recommended to start treatment in most patients.	I	A
If BP is not controlled with a dual combination at full tolerated doses, add a third drug in a triple SPC.	I	A
Fixed dose SPC of two or three drugs are preferred over free combinations with multiple drugs to increase adherence and persistence on treatment.	I	B
In patients with true resistant hypertension a MCRA such as spironolactone or eplerenone is recommended. In case of contraindication or intolerance to MCRA, an alpha-blocker, or a betablocker, or an ARNI (Sacubitril-Valsartan), or a central acting agent may be used.	I	A

FIGURE 5 Recommendations for pharmacological treatment.

used [1,2]. The combination of antihypertensive drugs in a single tablet increases the antihypertensive potency of the treatment, achieving higher BP reductions and BP targets in about 70–80% of patients. In addition, reduces HMOD and the incidence of MACE, improves the quality of life of patients reducing potential adverse effects, and improves persistence and adherence to treatment [1,2]. In the SPRINT study, the standard treatment arm required drug combinations in 57.4% of patients, whereas in the intensive treatment arm, combinations were required in 86.6%, with similar data in individuals over 75 years of age [97].

The initiation of treatment with dual combination compared with monotherapy has been shown to reduce global cardiovascular events by 66%, CAD by 59%, stroke by 34%, HF by 71%, and new-onset atrial fibrillation by 59% [101]. On the other hand, under equal conditions of adequate achievement of BP targets, patients controlled with SPC have a lower rate of hard outcomes. If BP targets are not achieved with a dual combination at low doses, increase the dose of the components if tolerated, or change the type of combination. If BP control is not achieved, associate a third medication (triple combination of a RAS blocker plus DH-CCB plus thiazide or thiazide-like diuretic). This strategy may control up to 90% of patients with hypertension.

If BP is not controlled with a triple combination at full tolerated doses, the physician will be facing a patient with apparent resistant hypertension. The diagnosis of true resistant hypertension must be confirmed with 24 h ABPM. Lack of adherence and secondary causes of hypertension must be ruled out. In patients with true resistant hypertension, a mineralocorticoid receptor antagonist (MRA) such as spironolactone (or eplerenone) is recommended. In case of contraindication or intolerance to MRA, an alpha-blocker, a betablocker, a central agent, or an ARNI (Sacubitril-Valsartan) may be used. MRA agents should not be used in patients with eGFR less than 30 ml/min/1.73 m^2 in which thiazide diuretics should be replaced by a loop diuretic with the possible addition of chlortalidone for its documented further lowering effect [2].

Which single pill fixed-dose combinations may be used?

Antihypertensive drug classes primarily recommended to be used in combinations are:

1. **Renin angiotensin system (RAS) blockers:** some physicians prefer ARB over ACEI because of the possible cough caused by the latter group, whereas others prefer ACEI over ARB, especially in patients with CAD, given that ARB, unlike ACEI, have not been shown to reduce mortality in these patients.
2. **Calcium channel blockers (CCB):** Long-acting dihydropyridines are preferred (DH-CCB), which allow dosing every 24 h, either on their own (amlodipine, lercarnidipine, manidipine) or by pharmaceutical manipulation (nifedipine-GITS).
3. **Thiazide (HCTZ) and thiazide-like diuretics (chlortalidone, indapamide):** despite some physicians preferentially use long-acting diuretics such as chlorthalidone or modified Indapamide, most fixed combinations are available only with HCTZ (a short-acting thiazide diuretic). In patients with eGFR less than 45 ml/min/1.73 m^2, it is recommended to switch to loop diuretics (short-acting furosemide or bumetanide, or preferably the long-acting torasemide whenever available). In patients with eGFR less than 30 ml/min/1.73 m^2, it is recommended to combine a loop diuretic with chlorthalidone.
4. **Betablockers:** it is recommended the preferential use of those with cardioselectivity (bisoprolol, nebivolol, and metoprolol succinate) and vasodilatory capacity (nebivolol and carvedilol).

Recommended combinations depending on the clinical characteristics of patients

The combination of a RAS blocker (ARB or ACEI) with a DH-CCB is preferred in patients where the primary aim is to reduce the risk of CAD or PAD, or when they have a metabolic profile (DM-2, MS, obesity). This combination is also preferred when the use of diuretics is not advisable (patients intolerant to cramps). It would be more convenient to start with a combination of DH-CCB + diuretic in people with ISH, Afro-descendants, low-renin hypertension, or intolerant to CCBs (severe ankle oedema) [1–3,102].

Use of antihypertensive drugs in special clinical conditions

Figure 6 summarizes the recommendations for antihypertensive treatment in hypertensive patients with different associated clinical conditions or comorbidities.

Resistant hypertension

Resistant hypertension is defined as above-goal elevated BP in patients despite the concurrent use of three antihypertensive drug classes at the maximal tolerated doses, commonly including a long-acting DH-CCB, a RAS blocker (ACEI or ARB) and a thiazide/thiazide-like diuretic. The diagnosis of true resistant hypertension requires assurance of antihypertensive medication adherence and exclusion of WCH by 24 h ABPM. Resistant hypertension also includes patients with BP at target values but treated with at least four antihypertensive medications. Management of resistant hypertension includes maximization of lifestyle interventions, use of long-acting thiazide-like diuretics (chlorthalidone or indapamide) if eGFR at least 30 ml/min/1.73 m^2, addition of a MRA, preferably spironolactone (or eplerenone in spironolactone intolerants), and loop diuretics in patients with eGFR less than 30 ml/min/1.73 m^2 [2,103,104]. Figure 7 shows the algorithm for management of patients with apparent resistant hypertension.

Novel antihypertensive drugs with new mechanisms of action

A number of novel agents for treatment of difficult to control hypertension are emerging for the first time in many years. These new agents that target novel BP-regulating mechanisms include endothelin receptor antagonists such as aprocitentan and darusentan, and aldosterone synthase inhibitors, such as baxdrostat, lorundrostat, and dexfadrostat. Novel nonsteroidal MRAs are also available, and finerenone shows a renal protective effect in patients with CKD despite inducing small BP reduction. Nonsteroidal MRAs such as esaxerenone, apararenone, and ocedurenone are in development. Other novel drugs are those interfering with the ribonucleic acid (siRNA) to inhibit the production of angiotensinogen such as zilebesiran, which antihypertensive effect after a single injection is maintained for up to 24 weeks. Finaly, analogues of the M-atrial natriuretic peptide (MANP) and inhibitors of aminopeptidase A, the enzyme that converts angiotensin II to the pressor angiotensin III, are also under research [105].

Follow-up of patients with hypertension

Close follow-up of hypertensive patients is crucial to find out the achievement of BP control, support and stimulate lifestyle modifications, assess drug adherence and medication side effects, adapt therapy if needed, and check for development or changes in HMOD [2]. Figure 8 shows LASH recommendations on how often patients should be seen, what should be checked in different visits, and who and which setting should be involved in the management of patients during follow-up.

Treatment and control of associated cardiovascular risk factors

Management of patients with hypertension and dyslipidaemia

Both hypertension and atherogenic dyslipidaemia have a high prevalence in LATAM. In the adult population hypertension prevalence has been reported to range between 18 and 62% [9,105–107]. The average of LDL-cholesterol values in a recent study was 149.5 ± 54 mg/dl. In addition, low levels of HDL-C range from 34.1 to 53.3% whereas the prevalence of elevated triglycerides (TRG) varies from 25.5 to 31.2% being usually more common in men than in women [107].

Up to 60% of hypertensive patients may have an abnormal lipid profile [108] whereas most patients with DM-2 of

Recommendations	Class	Level
In patients with WCH, close follow up and lifestyle interventions are recommended. BP-lowering treatment can be considered in patients with HMOD and high CV risk.	II	C
In patients with MH, close follow-up is recommended to timely identify sustained hypertension and new HMOD. BP-lowering treatment can be considered in patients with HMOD and high CV risk.	II	C
In patients in the first year after MI the use of a combination with ACEI (or ARB if intolerant to ACEI) plus a BB if LVEF < 50% is preferred. In case of angina a DH-CCB plus a Betablocker is recommended.	I	A
In patients with previous stroke an ACEI or ARB plus a DH-CCB or a diuretic (preferably Indapamide) is recommended.	I	A
In patients with HF an ACEI or ARB or ARNI + BB is recommended. Addition of a diuretic for congestion may be needed, and iSGLT2s should be used independently from the presence of DM-2.	I	A
In patients with CKD an ACEI plus a DH-CCB or a diuretic (loop diuretic in stages 4-5) is recommended. The use of an iSGLT2 and a non-steroidal MRA such as finerenone is especially recommended for diabetic patients.	I	A
In patients with AF and ACEI or ARB plus a BB or a non-DH-CCB is recommended. If heart rate is < 80 beats/min, use a DH-CCB.	I	B
In patients with psychiatric disorders an ACEI or ARB plus a diuretic is recommended. In case of drug-induced tachycardia the use fat-soluble BB, preferably propranolol, or nebivolol may be used, especially in patients with anxiety.	I	C
In patients with COPD an ACEI or ARB plus DH-CCB and/or diuretic is recommended. β1-selective BB may be used in selected high-risk patients (e.g. CAD or HF).	I	B
In patients with aortic valve stenosis and ACEI or ARB plus a BB is recommended.	I	C
In patients with hypertension and HIV/AIDS the same strategy as for the general population is recommended, but pharmacological interactions of AIDS therapy with CCBs must be considered.	I	C
In patients with COVID-19 and HT the choice of drugs and treatment strategies (including BP thresholds and targets for treatment) are the same as for the general population.	I	C
In patients with chronic inflammatory rheumatic disorders the same strategy as for the general population is recommended (preferably ARB or ACEI plus DH-CCB). Effective treatment of underlying	I	C

FIGURE 6 Antihypertensive treatment in special clinical conditions

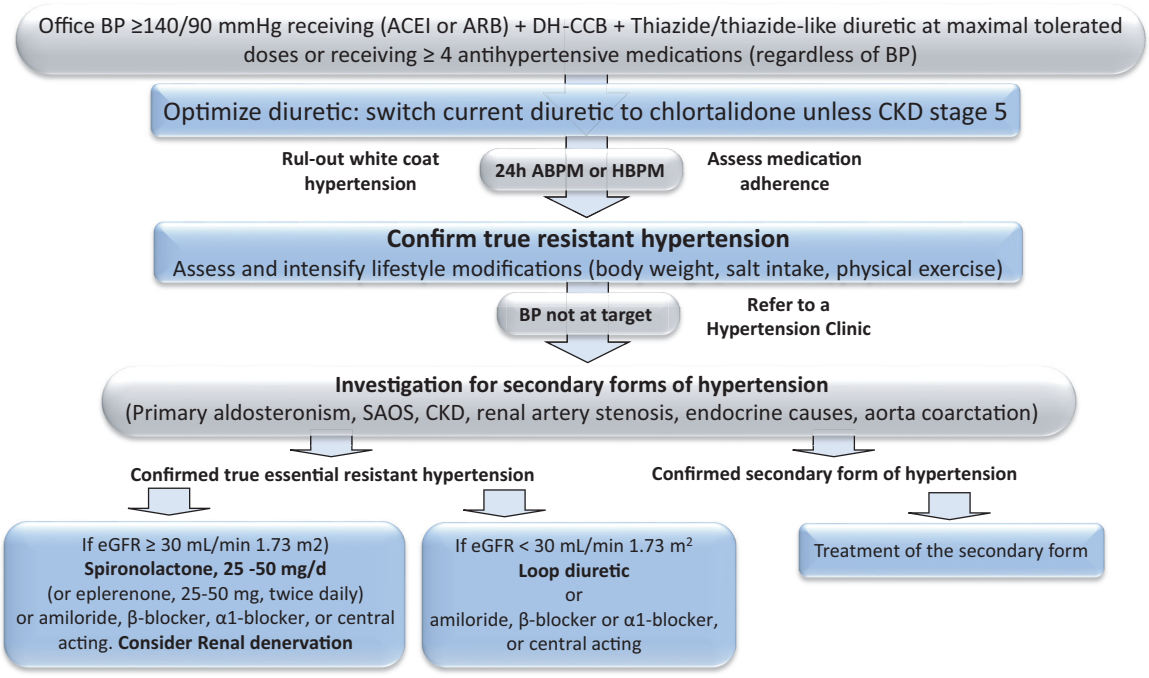

FIGURE 7 Algorithm for management of apparent resistant hypertension.

few years' duration have a BP elevation. The coexistence of hypertension and dyslipidaemia increases four times the risk of CVD and could increase more than 20-fold when multiple cardiometabolic risk factors (DM-2, obesity, and smoking) are present in the same patient [109] (Box 1). The Pan American Health Organization (PAO) recommends using the WHO prediction model in the region although LATAM cohorts were not included in the external validation of the global cardiovascular risk. The Non-Laboratory INTERHEART Risk Score (NL-IHRS) has the advantage of not requiring laboratory testing and has been validated using patients from the PURE study in Argentina, Brazil, Chile, and Colombia. This risk score could be a reasonable option in settings with limited resources and noneasy availability of blood tests [110,111]. Intervention strategies aimed to control BP, lipids, obesity, and blood glucose, are crucial to achieve maximal cardiovascular risk reductions [2] (Figure 9).

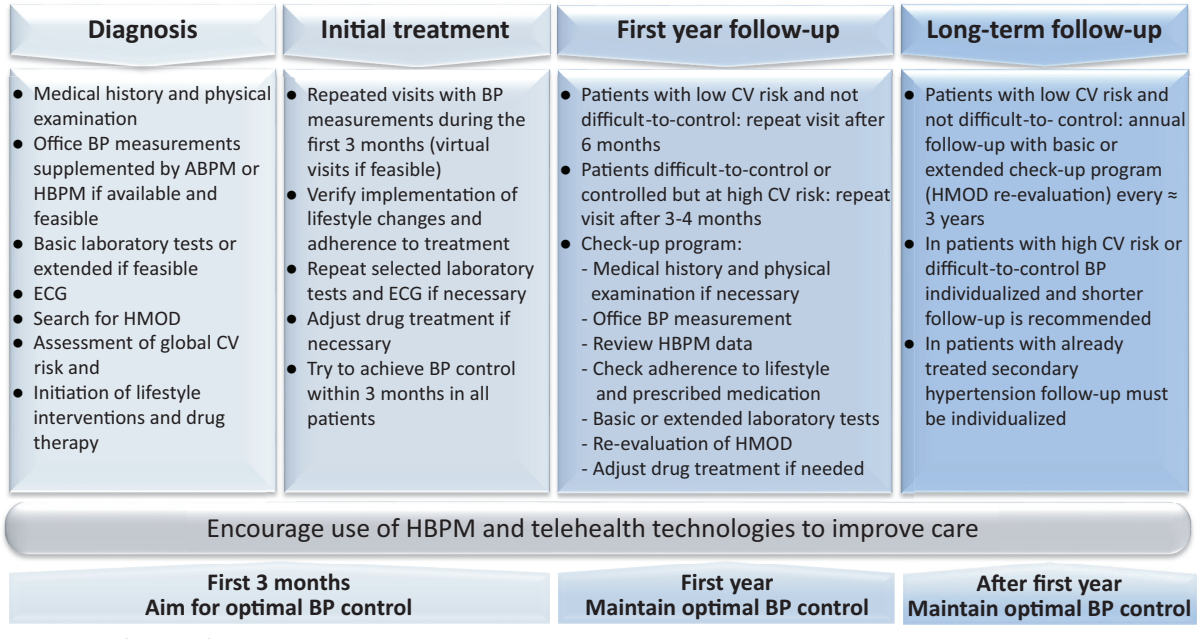

FIGURE 8 Recommended follow-up for patients with hypertension.

Box 1 Components of global cardiometabolic risk

- Anthropometric measures
- Abdominal waist
- Complete lipid panel (total cholesterol, TGR, HDL-C, non-HDL-C, calculated LDL-C)
- Fasting blood glucose and/or 2 h post oral 75 g of glucose
- Muscular handgrip strength

HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol.

Smoking

The prevalence of smoking in LATAM is still very high (37%) [112]. Cessation of tobacco use is the most effective lifestyle measure for the prevention of CVD, particularly in hypertension patients, and quitting smoking (including e-cigarettes) is strongly recommended.

Appropriate strategies should be implemented to avoid weight gain after quitting smoking. The target populations should be regarded not only as those already exposed to smoking but also those not yet exposed, largely composed of younger people. Counselling and motivational interviewing techniques in health centres have a documented effectiveness for smoking cessation. The associations between current smoking and uncontrolled BP differ over race/ethnicity and hypertensive Afro-American smokers are the more exposed.

Obesity

The prevalence is growing in LATAM (see section 'Lifestyle changes') as elsewhere in the world. Overweight and obesity are common problems in hypertension, and BP significantly increases for any mmHg BP increase. Among adult men, the prevalence of overweight increased from 29% in 1975 to 40% in 2014. Today, 1.6 million men suffer from obesity in LATAM. Low caloric diets, change in sedentary life habits, and increased physical activity are the primary measures to consider against overweight and obesity to reduce BP in hypertensive patients. New antiobesity drugs, such as semaglutide and terzepatide, and bariatric surgery have been shown to effectively reduce weight and BP. However, the high cost of these treatments makes difficult their application in LATAM.

Type 2 diabetes

The prevalence of DM-2 in LATAM ranges from 8.4 to 16% (Brazil 15 million of adults, Mexico 14 million of adults and Colombia 3.44 million of adults). The cardiovascular risk in people with DM-2 is two to three times higher than in those without the disease, carrying a twofold to six-fold risk of death for cardiovascular diseases. These estimates assume that DM-2 confers the same degree of risk in women and men, which is unlikely because while nondiabetic women are relatively protected from CVD, this advantage is lost in diabetic women. Both cardiovascular death and all-cause death risks are increased in persons with diabetes, as well as years of life loss of cardiovascular cause in men and women, mainly in productive working ages [113].

Diabetes is the most important risk factor for deterioration of renal function and end-stage CKD, but because of its prevalence, the highest absolute number of end-stage CKD is attributable to hypertension. The coexistence of DM-2

Recommendation	Class	Level
A complete lipid profile must be obtained in all patients with HT at the time of the diagnosis and repeated annually.	I	A
Patients with HT and dyslipidaemia should be considered, at least, patients with intermediate CV risk or greater.	I	A
LDL-C target in patients with HT and dyslipidaemia must be at least < 100 mg/dl.	I	A
Assessment of the global cardiometabolic risk in all patients with HT and dyslipidaemia is strongly encouraged.	I	A
It is recommended to initiate lifestyle modifications treatment (diet, weight loss, physical activity, smoking cessation) in all patients	I	A
It is recommended to initiate antihypertensive drug treatment with metabolically neutral antihypertensive drugs (ACEI or ARB with CCB) simultaneously with lipid lowering drugs (statin and ezetimibe) to achieve lipid targets. Other lipid-lowering drugs may be considered depending on patient's metabolic profile and risk to achieve stricter targets.	I	A

FIGURE 9 Management of dyslipidaemia in patients with hypertension.

and hypertension confers a striking increased risk (twofold to fourfold) of CVD, end-stage CKD, and death, compared with normotensive and with nondiabetic adults [113].

Antihypertensive treatment is of crucial importance to reduce cardiorenal risk in hypertensive diabetic patients. BP lowering less than 140/80 mmHg, and less than 130/80 mmHg if tolerated is recommended. However, BP targets should be individualized through a shared decision-making process addressing cardiovascular risk, potential adverse effects of antihypertensive medications, and individual preferences [114].

Blockade of the RAS should be, unless contraindicated, essential part of the therapy for their greater protective effect on the kidney, whose deterioration is associated with an increase of cardiovascular risk. These drugs must be combined with a CCB or a diuretic in a single pill. Use of SGLT2i may be recommended not only because of their documented renal and cardiac protective effect but also for their BP-lowering ability, even in addition to other antihypertensive drugs [115] (Figure 10).

Psychosocial stress and hypertension

In the last two decades, psychosocial stress, anxiety, depression, frustration, and anger, have received considerable attention in relation to hypertension. Despite some methodological limitations, the available studies show that psychosocial stress increases the risk of hypertension independently of other traditional risk factors [116]. Although data mostly comes from uncontrolled studies, therapeutic interventions such as yoga, mindfulness, and cognitive behavioural therapies (CBT) seem to be effective and safe in reducing psychosocial stress and hypertension [117,118].

Information on psychosocial stress and hypertension in LATAM is limited. Available studies indicate that psychosocial stress is associated with higher BP and/or an increased risk of developing hypertension. A study of a normotensive Brazilian cohort in a socially vulnerable context, (in marginalized neighbourhoods in the metropolitan area of Rio de Janeiro, showed that posttraumatic stress disorders (PTSD) were significantly associated with hypertension [hazard ratio = 1.94; 95% confidence interval (CI) 1.11–3.40] [119]. A cross-sectional study in a Chilean sample of 1872 workers investigated the relationship between burnout and BP. The probability of having diastolic hypertension among participants with personal burnout only, and with both types of burnouts (personal and work) was twice [odds ratio (OR) 2.00, 95% CI 1.21–3.31] and 2.08 times (OR 2.08, 95% CI 1.15–3.78) higher than in those participants without burnout [120]. In another Chilean sample, a cross-sectional study [121] analysed the relationship between psychosocial factors and adherence to treatment in 513 adults with hypertension. Low adherence was associated with a high level of emotional stress and depression (OR 1.93, 95% CI 1.27–2.94).

Serum uric acid and cardiovascular risk

Uric acid is the main hydrophilic antioxidant in human organisms, being responsible for about two-thirds of the total blood antioxidant capacity [122]. Uric acid also exerts an indirect antioxidant effect by protecting vitamins C and E [123], improving their protective effect against oxidative stress by scavenging reactive oxygen species and lipid hydroperoxyl radicals.

Serum uric acid (SUA) levels are higher in dyslipidaemia, hypertension, and insulin resistance [124]. Increased SUA levels are responsible for increased cardiovascular risk in middle-aged and older people with hypertension or diabetes [130]. The cardiovascular risk in hypertensive patients increases with SUA levels over 6 mg/dl, with a significant association with BMI, waist circumference, glycaemia, and LVMI [125]. Arterial stiffness assessed by PWV is related to

Recommendations	Class	Level
Immediate lifestyle interventions and antihypertensive drug treatment are recommended for people with DM-2 when office SBP is ≥ 140 mmHg or DBP is ≥ 90 mmHg.	I	A
Drug treatment strategies in patients with DM-2 should be the same as for patients without diabetes. The aim is to lower BP below <130/80 mmHg. Dual combination of ACEI or ARB (at maximal tolerated dose) and a CCB in a single pill is preferred to initiate treatment. Addition of a thiazide or thiazide-like diuretic, or a betablocker may be needed to achieve BP target.	I	A
MRAs (spironolactone, eplerenone) are nephroprotective and cardioprotective in patients with diabetic CKD and moderate to severe albuminuria and should be used with caution because of the risk of hyperkalaemia.	I	A
SGLT2i are recommended because they reduce BP levels, and cardiac and kidney events in diabetic patients	I	A

FIGURE 10 Management of hypertension in diabetes.

Recommendations	Class	Level
Evaluation of SUA is recommended in all patients with HT	I	C
Cardiovascular risk increases with SUA levels above 6mg/dL	I	B
Patients with hypertension at higher CV o renal risk and elevated SUA should be treated with allopurinol or febuxostat	I	B
Patients with hypertension, reduced glomerular filtration rate and elevated SUA should be treated with febuxostat	I	B

FIGURE 11 Management of serum uric acid in hypertensive patients.

SUA levels, and for each 1 mg/dl reduction in SUA, there is a decrease of about 0.88 m/s in PWV [126]. Moreover, in patients with CKD and DM-2, the increased SUA levels are associated with an increase in arterial stiffening, a risk factor related to cardiovascular and cerebrovascular events [127,128]. Management of SUA is summarized in Figure 11.

MANAGEMENT OF HYPERTENSION IN SPECIAL POPULATIONS AND ASSOCIATED COMORBIDITES

Hypertension in children and adolescents

The cut-off points for definition of hypertension in children and adolescents are not uniform in different guidelines, being the most accepted SBP at least 95th percentile or DBP at least 95th percentile, or both [129]. Office BP should be measured according to the modified American Academy of Pediatrics (AAP) age–sex–height nomograms [129]. Ideally, every LATAM country should have their own reference charts for diagnosis of hypertension in their populations.

Guidelines also differ in the age at which static thresholds are adopted: AAP suggests 130/80 mmHg starting at 13 years of age, and the ESH suggests 140/90 mmHg starting at 16 years. Most importantly, the threshold chosen must be used in all visits. The width of the optimally sized cuff should be approximately 40% of the arm circumference at its midpoint between acromion and olecranon, and the cuff bladder length should cover 80–100% of the arm circumference. ABPM can be useful in selected cases: suspected WCH, secondary hypertension, diabetes, and for antihypertensive therapy monitoring in clinical trials. BP measurement should be performed in all children older than 3 years, at least annually, and in all visits in patients with any condition associated with hypertension and should be part of every routine paediatric and adolescent evaluation [129–132]. Main characteristics of hypertension in children and adolescents are shown in Box 2 and treatment strategies recommendations in Figure 12.

Hypertension in the elderly

Hypertension is extremely frequent in older LATAM people, particularly involving SBP. ISH is the predominant hypertension phenotype above 70 years of age [2,133]. Characteristics of hypertension in elderly persons are summarized in Box 3.

Recommendation of initiate treatment in grade 1 hypertension, even in ISH is well supported [133]. Regarding BP targets, results of SPRINT [97,134,135] and STEP [98] trials support lower targets less than 130 mmHg in older patients if treatment is tolerated. The HYVET trial is the only showing a reduction of cardiovascular events and mortality by antihypertensive treatment in patients at least 80 years [133]. Benefits seems similar in moderately frail patients and fit older adults [134,136].

Frailty assessment is important to personalize treatment strategies, and antihypertensive strategies should be more conservative (SBP thresholds $\geq$160 mmHg to start treatment; SBP target <150 mmHg) in frail patients to avoid orthostatic hypotension, falls, and fractures [137]. Alpha-blockers, central acting agents, and highest doses of diuretics should be avoided because of the risk of syncope and severe hypotension, particularly in diabetics. Treatment strategy recommendations are summarized in Figure 13.

Box 2 Hypertension in children and adolescents

- Primary hypertension is diagnosed in the absence of an identifiable cause of secondary hypertension.
- Secondary hypertension is more common and severe in younger children (<6 years of age).
- Primary hypertension is the most prevalent type of hypertension in childhood, especially in adolescents. The leading risk factors for primary hypertension are excess adiposity and suboptimal lifestyle (ultra processed foods, sedentarism).
- Children diagnosed of hypertension using threshold $\geq$140/90 mmHg have severe hypertension, secondary to kidney disease, cardiac/vascular abnormality, or endocrinopathy.
- Predisposing factors for hypertension are overweight and obesity, family history of hypertension in a parent or grandparent, abnormal birth history (prematurity, small for gestational age, maternal preeclampsia and eclampsia, assisted reproductive technologies), kidney disease, repaired aortic coarctation, DM-1 and DM-2, genetic syndromes associated with hypertension, treatment with medications known to increase BP (stimulant medications, corticosteroids, calcineurin inhibitors, erythropoietin, and certain oncologic drugs).
- Assessment of HMOD is recommended. Three principal areas should be explored: kidney, cardiovascular system, and brain.

HMOD, hypertension-mediated organ damage.

Recommendations	Class	Level
Lifestyle changes are recommended as the initial action in all children or adolescents with HT to delay or minimize drug treatment: DASH diet, reduced sodium intake, vigorous exercise, and reduction of screen time or leisure activities.	I	A
In patients with primary hypertension: Antihypertensive medications are recommended to lower BP if lifestyle measures fail to normalize BP after 6-12 months of their implementation.	I	B
In patients with secondary hypertension: Immediate initiation of antihypertensive medications after diagnosis, and management of the underlying cause of secondary HT are recommended.	I	A
First-line agents include ACEI, ARB, DH-CCB, and thiazide/thiazide-like diuretics.	I	C
ACEI and ARB should not be used in female adolescents after menarche.	III	A
BBs are not recommended, except in specific conditions, due to potential side effects.	II	A
Additional recommendations: BMI and waist circumference should be measured according to consolidated methods.	I	A
ECG can be useful if properly interpreted	I	B
Echocardiogram to assess cardiac mass is recommended before initiation of antihypertensive medications.	II	B

FIGURE 12 Antihypertensive treatment strategies in children and adolescents.

Hypertension in established cardiovascular disease

Hypertension is extremely frequent in patients with CVD and CKD and its management and treatment follows specific recommendations concerning the type of drugs to be used [2]. However, the LASH guidelines want to emphasize that the most important objective in all these patients is to achieve strict BP control with the best tolerated drug strategy.

Box 3 Hypertension in older persons

- Biological age is more important than chronological age
- Two age thresholds are maintained to implement therapeutic strategies: 65–79 and ≥80 years.
- Progressive increase in SBP and PP with a decrease in DBP is common over 65 years.
- Pulse pressure >65 mmHg is an independent risk factor for cardiovascular morbidity and mortality.
- Patients aged 65–79 years with loss of autonomy/functionality should be managed as patients ≥80 years.
- Octogenarians commonly have associated comorbidities, frailty and loss of functionality. This is the most markedly growing group in LATAM.

LATAM, Latin America.

Coronary artery disease

The management of hypertension in CAD should consider reaching and maintaining BP control, preventing the progression of cardiac damage, and controlling angina [138]. Patients with CAD have a very high risk for MACE, and BP treatment must start in the high-normal BP range [2]. ACEIs and betablockers are the first-line drugs for management of patients with hypertension, and CAD and may be used in combination. If BP control is not achieved, a DH-CCB may be added [2]. In patients not tolerating betablockers or those with contraindication to ACEIs, a non-DH-CCB or an ARB can be used [2,138]. Non-DH-CCBs should never be associated with betablockers because of the risk of enhancing the negative inotropic effect or causing conduction disturbances (Figure 14 summarizes the recommendations for these patients).

Recommendations	Class	Level
In patients aged 65 to 79 years: BP threshold to start drug treatment is ≥140/90 mmHg and BP target <140/80mmHg.	I	A
Lowering BP <130/80mmHg may be considered if tolerated	I	B
In patients with ISH aged 65 to 79 years: SBP target is <150 mmHg, but SBP< 140 may be considered if treatment is well tolerated	I	A
Patients ≥80 years old: SBP threshold to start drug treatment is >160 mmHg, but SBP >140 mmHg may be considered.	I	B
SBP target is < 150 mmHg.	I	A
SBP target <140 mmHg may be considered if treatment is well tolerated.	II	B
Additional recommendations: In patients >65 assessment of functional status and cognitive function is recommended.	I	C
In frail patients, drug treatment strategy and targets should be individualized. Start with low-dose and up-titrate slowly.	I	C
Search for orthostatic hypotension should be systematic, and back titration or treatment discontinuation considered in these patients.	I	C
Reduction of drug treatment must be considered in patients ≥80 years with SBP <120mmHg.	II	C

FIGURE 13 Treatment strategies in older patients.

Heart failure

In patients with HFrEF, ACEIs, ARBs, betablockers, MRAs, SGLT2i, and semaglutide are the first-line drugs as they reduce morbidity and mortality [139]. However, the ARNi 'Sacubitril/Valsartan' is superior to ACEIs in managing HFrEF being preferred for the modulation of RAS [139–141]. All these drugs also can control BP in patients with HFrEF and hypertension [2,138]. In patients with cardiogenic pulmonary or peripheral congestion, diuretics may be used, preferably loop diuretics, although thiazide diuretics can be combined to achieve sequential blockage of the nephron [137]. In patients with HFpEF, a condition commonly associated with hypertension, similar criteria for managing hypertension in the general population can be applied [2,140,141].

In hypertensive patients with HF not reaching BP control targets with the use of ARNi/RASi, BBs and MRAs, the use of DH-CCB should be considered for BP management [2,140,141], but non-DH-CCBs are not recommended (Figure 14).

Atrial fibrillation

Hypertension is a major risk for atrial fibrillation, and at least three BP measurements by auscultatory methods should be taken to validate office BP in patients with atrial fibrillation. If digital sphygmomanometers are used, only those that have been validated in patients with hypertension and atrial fibrillation must be used. Achieve and maintain strict BP targets is crucial in these patients to reduce the progression of cardiac functional and structural damage, especially diastolic dysfunction and atrial myopathy [2,142]. Heart rate control is also essential in patients with atrial fibrillation, thus betablockers and RASi must be considered as first-line drugs in these patients [143,144]. Combinations of betablockers and non-DH-CCB are formally contraindicated (Figure 14). The association of hypertension and atrial fibrillation increases the risk of thromboembolic events, thus oral anticoagulants must be considered unless there is a formal contraindication for its use [143,144].

Hypertension in cerebrovascular disease

Hypertension-mediated brain damage is characterized by the presence of WML, lacunar infarcts and microbleeds as manifestation of cerebral small vessel disease (SVD) and may promote cortical atrophy [2,145]. Silent brain damage is common in severe and long-standing hypertension, and long-term cumulative BP increases the risk of stroke, cognitive impairment, dementia, and mortality [146,147]. WMLs depict demyelination areas disconnecting corticosubcortical circuits and causing cognitive impairment, that may be considered a 'surrogate' of vascular brain damage (VBD) [145]. Characteristics of brain damage in hypertensive patients are summarized in Box 4.

Recommendations	Class	Level
Coronary Artery Disease (CAD)		
BP treatment must be started in the high normal BP range (SBP ≥130 mmHg and/or DBP ≥80 mmHg)	I	A
In patients with hypertension and CAD: BBs, ACEI, (ARBs in ACEI non-tolerant) are first line drugs for AF treatment and BP control.	I	A
BBs, DH-CCBs, and non-DH-CCBs are recommended for BP and angina control.	I	A
Combination of BBs and non-DH-CCBs is contraindicated.	,,,	C
In patients with HFrEF		
Treatment with ACEIs/ARNIs, BBs, MRAs and SGLT2i are recommended to reduce mortality and morbidity	I	A
In patients with fluid retention (pulmonary or systemic congestion), addition of a loop diuretic must be considered	I	B
Addition of thiazide or thiazide-like diuretic should be considered to achieve sequential nephron blockade in patients with fluid retention	II	B
In patients who do not reach BP goals with first line drugs, addition of a DH-CCB should be considered	II	B
The use of non-DH-CCBs is contraindicated	III	C
In patients with HFpEF		
The use of ACEIs/ARNIs, DH and non-DH-CCBs, and SGLT2i should be considered	II	B
In patients with AF		
At least three BP measurements using auscultatory method should be taken	I	C
BBs, RASi and CCBs must be considered first-line drugs in patients with HT and AF	I	A
Oral anticoagulants must be considered to reduce the risk of thromboembolic events	I	A
Combination of BBs and non-DH-CCBs is contraindicated	III	C

FIGURE 14 Treatment strategies in hypertension and cardiovascular disease.

Box 4 Hypertension-mediated brain damage

- Cerebral SVD remains silent along years (≥10 years).
- The burden and progression of the WML is related to BP control.
- One-third of hypertension patients have brain damage without cardio-renal damage.
- Half the strokes are attributed to hypertension.
- BP control prevent stroke, poststroke *CI* and dementia.
- Hypertension is the main modifiable vascular risk factor for dementia.
- High BP in midlife is associated with dementia in late life.
- Assessment of hypertension-mediated brain damage improves risk stratification and is recommended in all hypertensive patients.

BP, blood pressure; CI, cognitive impairment; SVD, small vessel disease; WML, white matter lesion.

Screening test to assess cognitive function [2,148–152] are summarized in Box 5.

BP control reduces the burden of WML, brain atrophy, and can prevent Alzheimer's and vascular dementia, even in very old and frail patients [2,153]. Achievement of lower BP targets (SBP <130 mmHg) reduces cognitive impairment and dementia in comparison with SBP <140 mmHg target [154] (Figure 15).

Hypertension in kidney disease

DM-2 and hypertension are the strongest risk factors for development of CKD, and the most common causes for end-stage kidney disease (ESKD). Assessment of kidney function is based on the evaluation of the eGFR using the

Box 5 Hypertension-mediated cognitive impairment

Thirty percentage of hypertensive patients present CI and 40% risk for dementia.

- Executive dysfunction is the most common affected cognitive domain, followed by memory domain.
- MRI is not recommended as routine screening test to detect HMOD.
- The 'clock drawing test' is recommended to detect executive dysfunction and memory loss in clinical routine clinical.
- Any neuropsychological test battery implemented must include proofs evaluating executive functions (e.g. MoCA test).

CI, cognitive impairment; MoCA, Montreal Cognitive Assessment.

CKD-EPI equation and/or the detection of kidney damage by UACR, and is stablished when eGFR is less than 60 ml/min/1.73 m^2 and/or UACR greater than 30 mg/g along 3 months or more (see section 'Renal damage assessment') [57–60,155,156].

At least in patients with proteinuria greater than 1 g/day, lower BP targets are associated with better kidney outcomes [157,158]. Evidence comparing different BP targets in CKD comes mainly from nondiabetes trials, the modification of diet in renal disease (MDRD) and African American study of kidney disease and hypertension (AASK) studies, showing no differences in cardiovascular outcomes but a decrease in CKD progression associated with a more intensive BP control [159,160]. Considering that hypertensive patients with CKD are high-risk patients, all guidelines suggest a BP target less than 130/80 mmHg both in persons with diabetes and without diabetes.

In addition to lifestyle interventions (see section 'Lifestyle changes'), the recommended strategy is the combination of a RAS blocker with a DH-CCB or a thiazide/thiazide like diuretic when eGFR at least 30 ml/min/1.73 m^2 [2,161,162]. In patients with eGFR less than 30 ml/min/1.73 m^2, loop diuretics should generally replace thiazide/thiazide-like diuretics, whereas in patients with eGFR between 30 and 45 ml/min/1.73 m^{2+}, transition to a loop diuretic should be individualized. A recent meta-analysis has shown that thiazide diuretics and the thiazide-like chlorthalidone maintain their effectiveness in lowering BP even in advanced CKD with eGFR less than 30 ml/min/1.73 m^2 [163,164]. ARBs or ACEIs should be used at the maximal tolerated doses in association with SGLT2i, mainly in patients with albuminuria [2,165,166] (Figure 16).

Hypertension in Afro-descendants and mulattoes in Latin America

Hypertension among Afro-descendants and mulattoes in LATAM is a public health challenge characterized by disparities in prevalence, awareness, treatment, and control compared with other demographic groups [167]. Genetic predisposition, coupled with socioeconomic factors, lower income and education, and limited healthcare access, contributes to their heightened susceptibility to hypertension compared with Caucasians. Insufficient awareness and screening initiatives within Afro-descendant communities lead to underdiagnosis, undertreatment, and higher prevalence of resistant hypertension [2]. Collaborative efforts, involving healthcare providers, policymakers, community leaders, and advocacy groups are essential for alleviating the hypertension burden among Afro-descendant communities in LATAM. Additionally, many Afro-descendants have other comorbidities such as obesity, DM-2, and CKD, and these patients also show poor glycaemic control compared with those without CKD [168]. Encouraging lifestyle modifications like a healthy diet and regular physical activity is crucial for hypertension prevention and management. DH-CCB and thiazide/thiazide-like diuretics are more effective than ACEI or ARB [2]. See Figure 17.

Hypertension in Andean, high-altitude population

More than 140 million individuals live at more than 2500 m above sea level, and the prevalence of hypertension in this population ranges from 8.6 to 55.6% depending on different sources [169,170]. A recent study in adults living in a high-altitude rural setting in the Andes of Peru found that 18% of this population had hypertension. The

Recommendations	Class	Level
Cognitive screening tests (Clock drawing or MoCA test) should be considered in all hypertensive patients ≥ 40 yrs, with cognitive symptoms.	II	B
Brain MRI is only recommended for patients with HT and neurologic symptoms and/or confirmed CI.	II	B
Antihypertensive treatment and strict BP control (BP < 130/80 mmHg) in midlife reduces the incidence of stroke and dementia. Treatment of very old (≥85 years) and frail patients may also reduce the risk of dementia.	I	A
ARBs combined with CCBs, or thiazide diuretics are more effective in prevention of dementia.	II	B

ARB: angiotensin receptor antagonist; CCB: calcium channel blocker

FIGURE 15 Recommendations for patients with hypertension and cerebrovascular disease.

Recommendations	Class	Level
HT is the main risk factor for ESKD, and BP must be monitored in all stages of CKD.	I	A
A BP target < 130/80 mmHg is recommended for diabetic and non-diabetic patients with CKD, and after kidney transplant.	II	B
A BP target < 120/70 mmHg is not recommended.	III	C
An ACEI or an ARB titrated to maximum tolerated doses is the first line pharmacological therapy in patients with CKD and albuminuria. Most patients will need the association of a DH-CCB or a thiazide/thiazide like diuretic to achieve BP targets.	I	A
Finerenone is recommended in diabetic patients with CKD if eGFR > 25 ml/min/1.73² and serum K+ < 5.0 mmo/L. to reduce cardiac and kidney outcomes.	I	A
SGLT2i are recommended for patients with diabetic and non-diabetic CKD if eGFR is > 20 ml/min/1.73²	I	A

FIGURE 16 Treatment strategies in patients with chronic kidney disease.

prevalence increased with age, and men over 64 years of age were at higher risk than women. Importantly, about 72% of the participants were unaware of their hypertension [170].

BP increases a few hours after acute exposure to high altitude, principally during the night, and remains unchanged in the following days. Hypertensive patients are more susceptible to these changes because of the increased

Recommendations	Class	Level
In Afrodescendants: -Due to common associated comorbidities (obesity, DM-2 and CKD), lifestyle modifications, particularly healthy diet, physical exercise and weight control are crucial. DH-CCB and thiazide/thiazide-like diuretics are more effective than ACEI or ARB.	I	A
In Andean population: Appropriate modification of antihypertensive drugs should be considered in moderate/high risk hypertensive patients planning to be exposed to high altitude	II	C
The ARB telmisartan lowers BP in individuals living up to 3,000 meters above sea level	I	B
Acetazolamide lowers BP and improves oxygen saturation minimizing symptoms of mountain sickness (“puna”, “soroche”)	I	B
Telmisartan/nifedipine or telmisartan/amlodipine combination effectively lowers BP in individuals living at 3,000 meters above sea level	I	C
Nebivolol effectively reduces the BP elevation induced by altitude and preserves the nocturnal pattern. Selective β-1 blockade is associated with better physical performance at high altitude	I	C

FIGURE 17 Management of hypertension in Afro-descendants and Andean populations.

sensitivity of the chemoreflex mediated by both peripheral and central hypoxia and altered calcium homeostasis [171,172]. However, hypertension prevalence is lower at altitude, with office IDH occurring more frequently [173]. ABPM assessment has shown that isolated nocturnal hypertension, and masked hypertension, are more frequent than WCH with a nondipper circadian profile [29,174].

Several antihypertensive drugs and combinations are effective and save at high altitude, particularly combinations of DH-CCBs and ARBs [175,176]. The highly selective β-blocker nebivolol is effective in reducing the pressor response to altitude, preserving the pattern of nocturnal decline in BP, and attenuating exercise intolerance. Finally, acetazolamide also prevents the BP rise induced by altitude [176]. See Figure 17.

HYPERTENSION IN WOMEN

Behaviour of blood pressure throughout the life cycle in women

Hypertension may begin at any stage of a woman's life cycle [177]. Presence of hypertension in pregnancy can lead to increased maternal and offspring risk of CVD and is the second leading cause of maternal and/or neonatal mortality. The incidence of hypertension increases in menopausal women because of hormonal changes and vascular ageing processes [178]. Detection and control of all associated CVRF is crucial at all stages of woman's life. Figure 18 summarizes recommendations for hypertension in women [179].

Cardiovascular risk factors associated with hypertension in women

Social determinants of health related to sex and biological factors specific to the female sex must be considered when assessing CVRF in women, as adopted by the latest guidelines for the prevention of CVD in women [179]. Conventional and emerging CVRFs have differences in prevalence, their impact on women's cardiovascular risk, and their association with hypertension. Furthermore, women have unique CVRF linked to hormones and pregnancy, which are related to hypertension [180,181]. Box 6 summarizes the main CVRF associated with hypertension in women.

Box 6 Main cardiovascular risk factors associated with hypertension in women

- **Conventional:** age, overweight and obesity, central obesity, type-2 diabetes, smoking, dyslipidaemia, sedentarism.
- **Emergent:** Autoimmune diseases, chronic stress, psychosocial factors, environmental pollution, and noise
- **Exclusive:** Menopause, polycystic ovary syndrome, hypertensive disorders of pregnancy, oral contraceptive use

CVRF, cardiovascular risk factors.

Recommendations	Class	Level
Associated CVRF must be detected, addressed and controlled. Lifestyle changes are like those described in section 3.1. with particular attention to the reduction of overweight or obesity, and regular physical exercise.	I	A
In young pre-menopausal women: BP should be measured before the indication of oral contraceptives and assessed every six months. Investigate secondary forms of HT and treat accordingly.	I	A
ACEI or ARB should not be prescribed due to its proven teratogenic effects in case of pregnancy, except in specific circumstances and with contraception measures.	III	A
In menopausal and post-menopausal women: Initiate treatment strategy with the combination of an ACEI or ARB with a CCB or a thiazide or thiazide-like diuretic. Betablockers must be used in monotherapy or combination in specific clinical indications. A single pill combination is recommended to improve adherence.	I	A
Thiazide diuretics may be useful in women with osteoporosis.	I	C

ACEI: angiotensin converting enzyme inhibitor; ARB: angiotensin receptor blocker; CCB: calcium channel blocker.

FIGURE 18 Management of hypertension in women at various stages of life.

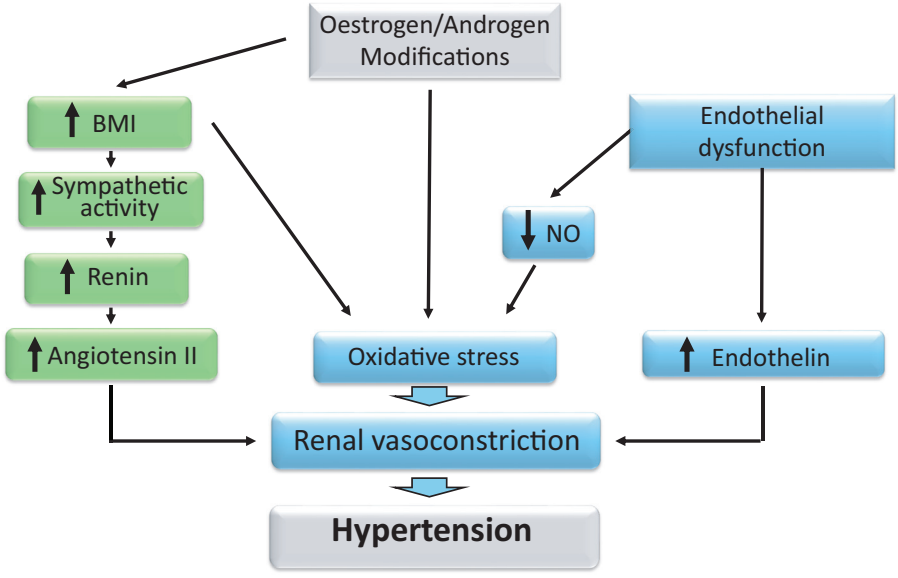

FIGURE 19 Sex hormones and postmenopausal hypertension. Adapted from reference [184]. NO, nitric oxide.

Menopause and hypertension

The prevalence of hypertension in women increases with age, and over 65 years is significantly higher than in men [181,182]. Menopause is associated with a decrease in oestradiol and an alteration in the oestrogen/androgen ratio. Weight gain is frequent at this stage, which can induce sympathetic stimulation and increased renin and angiotensin with increased oxidative stress. In addition, hormonal changes induce endothelial dysfunction, decreased nitric oxide, and increased endothelin [182–184]. All these mechanisms increase salt sensitivity and produce renal vasoconstriction and hypertension (Fig. 19).

Blood pressure in young women and contraception

Hypertension in young women may be associated with conditions such as pregnancy, polycystic ovary syndrome, and the use of combined oral contraceptives (COCs), which may influence cardiovascular risk. The incidence of new cases of hypertension associated with COC use is 5% [2,185]. Activation of the RAS system and water retention play a role in the genesis of hypertension related to COC [186].

Particularly, COCs containing oestrogen and progesterone are more likely to affect BP [2,185]. Drospirenone, a newer progestin with antimineralocorticoid properties, has been shown to reduce SBP by 1–4 mmHg when combined with ethinyl oestradiol, but is associated with an increased risk of venous thromboembolism. Progestin-only contraceptives and lower dose oestradiol-only formulations are associated with smaller BP elevations compared with other COCs. The risk of developing hypertension increases with duration of COC use, with a 13% increase in risk for each 5-year increment in use [2,187,188]. Figure 20 summarizes recommendations for young women using contraceptives.

Hypertension in pregnancy

Hypertensive disorders of pregnancy (HDP) pose a significant public health challenge in LATAM low-income to middle-income countries (LATAM-LMIC), with a considerable impact on maternal and perinatal morbidity and mortality. Their prevalence in the region ranges from 6.6 to 15%, and about 10–15% of maternal deaths in the area are related to HDP, making it the leading cause of direct maternal death [189,190]. The epidemiology of HDP in LATAM mirrors global patterns, with an observed increase in the incidence

Recommendations	Class	Level
BP must be measured before prescribing COCs and should be monitored during treatment.	I	A
Patient education about the importance of monitoring BP and other CVRF, adherence to follow-up visits, and self-monitoring of BP is recommended.	I	C
In case of persistent elevation of SBP ≥160 mmHg and/or DBP ≥100 mmHg, consider other contraceptive methods or discontinuation of COCs.	I	C

FIGURE 20 Recommended follow-up for women using combined oral contraceptives.

of preeclampsia and other hypertensive pregnancy complications [191].

International and LATAM-LMIC guidelines aimed at the prevention, early detection, treatment, and control of HDP with efficiency, and equity are based on existing high-income country guidelines, where unique aspects of the genomics, geography, and ethnicity of the target population are not considered [192,193].

Thus, specific-country recommendations for HDP management in LATAM-LMIC entail significant challenges, including the need to improve access to quality prenatal care and monitoring, promote early diagnosis, ensure access to appropriate quality treatment, and establish multidisciplinary management to improve maternal and perinatal outcomes [194], especially in rural and underserved areas where pregnancy complication rates are particularly higher [195,196]. Additionally, policies promoting early detection of risk factors and appropriate management of HDP should be implemented to reduce maternal and perinatal mortality rates [197–199].

Hypertension in pregnancy is defined as office BP greater than 140/90 mmHg, based on the average of at least two BP measurements following the strict protocol (see section 'Blood pressure measurement and monitoring'), and classified according to gestational age at diagnoses, maternal end organ damage, and uteroplacental dysfunction. Preexisting chronic hypertension is associated with an excess of adverse maternal and foetal outcomes, including superimposed preeclampsia, what emphasizes the importance of achieving 'tight' BP control during pregnancy. The current medications recommended for the severe hypertension (SBP ≥160 mmHg or DBP ≥110 mmHg) are hydralazine, labetalol, and immediate-release oral nifedipine, associated to magnesium sulphate for seizures prophylaxis. Nonsevere hypertension (SBP 140–149 mmHg or DBP 90–109 mmHg) should be treated with methyldopa, labetalol, or nifedipine. The time of delivery is indicated at any gestational age in severe cases. Low-dose aspirin is recommended for all high-risk patients since first trimester of gestation [200].

Box 7 Renal disease in women with hypertension

- Women with CKD and hypertension are more vulnerable to the effect of fluid overload on the left ventricle, so it is recommended to strictly maintain the dry weight goal.
- All women with hypertension should undergo screening for CKD, at least every 6 months, measuring serum creatinine, albumin/creatinine ratio and proteinuria.
- Hypertensive women using hormone replacement therapies show a significant increase in albuminuria.
- Data on the effect of renal denervation in women are scarce, and specific studies in this population are needed.

CKD, chronic kidney disease.

Renal disease in women with hypertension

The global prevalence of chronic kidney disease (CKD) reported by the NHANES study shows a higher incidence in women (51.7%), which doubles in those over 40 years of age and increases 20 times in those over 65 years. However, a recent meta-analysis including more than two million individuals has shown that the incidence of CKD because of hypertension is lower in women compared with men [201]. Box 7 shows particularities of renal disease in women [202–208], and Figure 21 summarizes the recommendations for these patients.

Recommendations	Class	Level
An ACEI or an ARB titrated to maximum tolerated doses is the first line pharmacological therapy in women with CKD and albuminuria.	I	A
A BP target < 130/80 mmHg is recommended for diabetic and non-diabetic women with CKD, and after kidney transplant.	II	B
Avoid the use of ACEI in women >75 years due to the high risk of renovascular disease and high prevalence of hyporeninaemia. Starting with a dihydropyridine CCB is preferred. Most patients will need the association of a thiazide/thiazide like diuretic to achieve BP targets.	II	B
Intensive pharmacological management regimens are not recommended in patients at risk of acute kidney injury, especially based on diuretics.	II	B
Non-steroidal MRA are recommended in diabetic women with CKD if eGFR > 25 ml/min/1.73² and serum K+ < 5.0 mmo/L.	I	A
SGLT2i are recommended for women with diabetic and non-diabetic CKD if eGFR is > 20 ml/min/1.73²	I	A
Referral of women with resistant hypertension for renal denervation must be individualized due to the lack of data on efficacy and safety.	III	C

FIGURE 21 Management of hypertension and renal disease in women.

How to address sexuality in hypertensive women

Sexuality is a central aspect of human beings and is present throughout their lives. It encompasses sex, gender identities and roles, eroticism, pleasure, intimacy, reproduction, and sexual orientation. Its experience is expressed through thoughts, fantasies, desires, beliefs, attitudes, values, behaviours, practices, and interpersonal relationships. We speak of sexual dysfunction when there is a set of disorders that make it difficult for the individual to enjoy their sexual activity as they would like to. It is important to provide comprehensive care to hypertensive women and to address the sexual dimension [209].

In hypertensive women, there are some medications that should be avoided or followed up. Thiazide diuretics, beta-blockers, and digitalis have been shown to increase the risk of sexual dysfunction. Psychological counselling, alone or in combination with medical treatment, can be helpful for women and couples suffering from sexual dysfunction. Vaginal oestrogen therapy can improve sexual function by increasing vaginal lubrication and reducing dyspareunia in women affected by vulvovaginal atrophy [210].

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Conflicts of interest

There are no conflicts of interest.

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