IV Brazilian Guidelines on Hypertension

IV Diretrizes Brasileiras de Hipertensão Arterial
IV Brazilian Guidelines on Hypertension

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Introduction

Hypertension is one of the most important health problems in Brazil. It raises the social-medical costs, mainly because of its complications such as cerebrovascular diseases, coronary artery diseases and vascular diseases of the extremities, in addition to cardiac heart failure and chronic renal failure.

Since 1963, cardiovascular diseases have outnumbered other causes of death; they presently account for 27% of all deaths. There was an increase in the mortality risk from these diseases between 1980 and 1984, followed by a decrease until 1996.

Different from North America, which showed a 60% mortality reduction from cerebrovascular causes and a 53% reduction from coronary artery causes, in Brazil (Figure 1) the reductions observed were 20% and 13%, respectively. The trends of mortality risk by cardiovascular diseases are different in the various regions of the country; there is a decrease in the Southeast and South, an increase in the Center-West and Northeast, and stable levels in the North[1] (**B**).

There are few prevalence studies and they do not represent the reality of the country. The investigations shown in Figure 2 indicate high prevalence between 22-44%[2] (**B**) [3-6](**A**) [7](**C**). Due to this reality, control programs should be established throughout the country.

Diagnosis and Classification

Hypertension is diagnosed by measuring blood pressure using the methods and conditions described on Table 1, according to the blood pressure levels reported on Table 2.

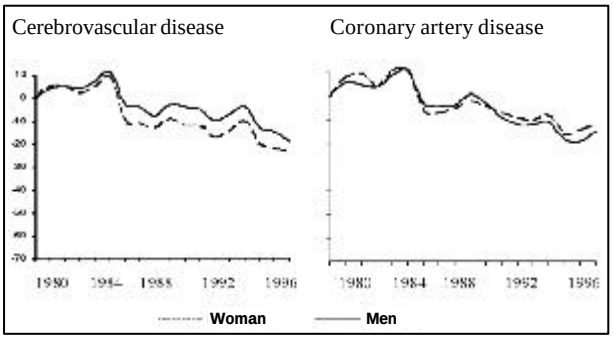

Fig. 1 - Mortality in Brazil from 1980 to 1996. Percentage of decrease adjusted by age.

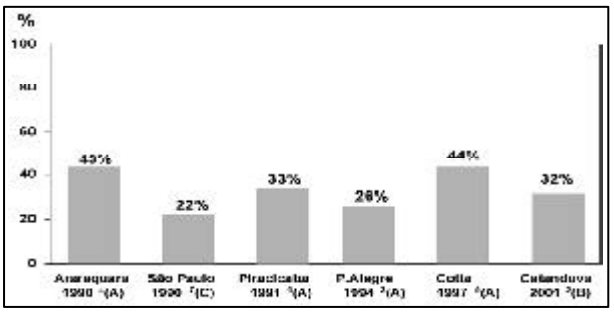

Fig. 2 - Prevalence of arterial hypertension: populational studies for arterial blood pressure ≥ 140/90mmHg.

Measurement of Arterial Pressure[17,19](D)

The mercury column manometer is the most appropriate device. The aneroid variety must be tested every 6 months and the electronic models are indicated only when validated.

Diagnostic Routine (D)

A minimum of two blood pressure measurements must be taken at each medical examination, both with the patient seated; if diastolic pressures show differences above 5 mm Hg, new measurements should be taken until a smaller difference is obtained. In a first evaluation, the measurements must be taken in both upper limbs. If a difference is noticed, the arm to be used is the one with the higher blood pressure. Measurements should be repeated in at least 2 or more appointments before the diagnosis of hypertension is confirmed.

Measurement in orthostatic position must be taken at least during the initial evaluation, especially for the elderly, or for diabetic patients with dysautonomias, alcohol addicts, and users of antihypertensive medication.

Table 1 – Measurements of arterial blood pressure

1. Make sure that the patient's bladder is not full or that the patient has not practiced physical activities, or ingested alcoholic drinks, coffee, food or has smoked up to 30 minutes before the measurement. Keep legs uncrossed and arm at heart level[8-13](**B**) [14](**D**).
2. Let the patient rest for 5-10 minutes[8-11,13,15](**B**).
3. Use a cuff of appropriate size (rubber bag; width = 40% and length = 80% of arm circumference)[16](**B**).
4. Palpate the radial pulse and inflate the cuff until the pulse disappears to estimate the systolic pressure[17](**D**).
5. Place the stethoscope's chestpiece over the brachial artery[17](**D**).
6. Rapidly inflate the cuff until reaching 20 to 30 mmHg above the estimated level of systolic pressure. Deflate cuff slowly[17](**D**).
7. Determine the systolic pressure upon beginning of sounds and diastolic pressure upon disappearance of sounds. Do not round up values to digits ending in zero or five[17](**D**).

Table 2 – Classification of arterial blood pressure (> 18 years old) and guidelines for follow-up with maximum intervals, modified according to the patient's clinical status [18](B)

Classification	Systolic	Diastolic	Follow-up
Optimal	< 120	< 80	Re-evaluate in 1 year
Normal	< 130	< 85	Re-evaluate in 1 year
Borderline	130-139	85-89	Re-evaluate in 6 months*
Hypertension			
Stage 1 (mild)	140-159	90-99	Confirm in 2 months*
Stage 2 (moderate)	160-179	100-109	Confirm in 1 month*
Stage 3 (severe)	> 180	> 110	Immediate intervention or re-evaluate in 1 week*
Isolated Systolic	> 140	< 90	

*When systolic and diastolic pressures are in different categories, the classification should follow the higher level encountered.
Consider intervention according to major risk factors and comorbidities.

Criteria for Diagnostic Classification and Follow-up Recommendations[20](D)

Any numerical value is arbitrarily attributed and any classification is insufficient. One must consider, in addition to the pressure levels, the presence of risk factors, comorbidities and target organs lesions listed on Table 3.

Children and adolescents have their arterial pressure classified according to the percentiles of height and gender. Values ? 95 percentile are regarded as arterial hypertension.

Clinical Investigation and Therapeutic Decision

The objectives of the clinical investigation include the confirmation of persistent elevation of arterial pressure, evaluation of lesions in target organs, identification of cardiovascular risk factor, diagnosis of associated diseases and etiology of hypertension. To reach this goal, one must consider: a) clinical history – in addition to the usual data of the patient's gender, age, race, socioeconomic status, smoking habits, time since onset of hypertension and blood pressure levels, overweight and obesity, symptoms of coronary artery disease, stroke, or coronary artery disease in family members (in women < 65 years old and men < 55 years old), signs and symptoms of cardiac heart failure, family history of hypertension, cerebral vascular disease, early/sudden death of close family members, peripheral vascular failure, depression, anxiety, panic, renal disease, family situation, diabetes mellitus, salt and alcohol intake, use of medication or drugs that might affect arterial blood pressure, risk factors for atherosclerosis, level of physical activity, dyslipidemia, weight loss and evidence of secondary hypertension, which must always be analyzed when characteristic manifestations are present b) physical examinations – emphasizing weight and height, mitral and aortic murmurs, abdominal circumference, rales, roaring, sibilus, signs of secondary hypertension, abdominal masses (tumors, aneurisms, hydronephrosis, polycystic kidneys), measurements of arterial blood pressure, abdominal murmurs (renal, aortic), pulse rate, brachial, radial, femoral, tibial and pedis pulses, carotid palpation and auscultation, presence of edema, venous stasis, concise neurological exam, thyroid palpation, eye ground exam, ictus suggestive of left ventricular hypertrophy/dilatation, third heart sound (systolic dysfunction of left ventricle), hyperphonesis of A2; c) routine laboratory tests – urinalysis, potassium, creatinine, fasting glucose test, total cholesterol, HDL-cholesterol, triglycerides and electrocardiogram; LDL-cholesterol may be estimated when triglycerides level are below 400mg/dl using the formula: LDL-cholesterol = total cholesterol - HDL-cholesterol - triglycerides/5; d) complementary evaluation if there is evidence of secondary hypertension, target organ injury, or associated diseases [21,22](**D**).

To start the treatment, one must consider the blood pressure levels and the patient's risk according to Tables 3 and 4.

Multiprofessional Approach

Arterial hypertension is a multifactorial disease and as it involves guidelines directed to various objectives, it may demand help from other healthcare professionals in addi-

Table 3 - Components for stratification of patient individual risk according to the presence of risk factors e damage to target organs (D)

Major risk factors:
- Smoking;
- Dyslipidemias;
- Diabetes Mellitus;
- Age > 60 years old;
- Family history of cardiovascular disease in:
  - Women < 65 years old;
  - Men < 55 years old.

Damage to target organs and cardiovascular diseases:
- Cardiac diseases:
  - Left ventricular hypertrophy;
  - Angina pectoris or previous myocardial infarction;
  - Previous myocardial revascularization;
  - Heart failure
- Ischemic episode or stroke;
- Nephropathy;
- Arterial vascular disease of extremities;
- Hypertensive Retinopathy.

Table 4 – Therapeutic decision according to blood pressure values and classification of patient individual risks regarding the presence of risk factors and damage to target organs [23](D)

	Risk A	Risk B	Risk C
	Absence of risk factors and damage to target organ	Presence of risk factors (not including diabetes mellitus) and no damage to target organs	Damage to target organs, cardiovascular disease clinically identifiable and/or diabetes mellitus
Normal/Borderline (130-139/85-89)	LSC	LCS	LCS*
Stage 1 (140-159/90-99)	LSC (up to 12 months)	LSC** (up to 6 months)	LSC + DT
Stages 2 and 3 (≥ 160/ ≥100)	LSC + DT	LSC + DT	LSC + DT

LSC = lifestyle change; DT = drug treatment.
* DT, if heart failure, renal failure or diabetes; ** DT, if multiple risk factors.

tion to the physician. The setup of this multiprofessional team will provide a differentiated approach to hypertensive patients [24](**A**).

The Team

It may be composed of physicians, nurses, nurse aides, nutritionists, psychologists, social assistants, physical education teachers, pharmacists, management employees, and community agents. It is not necessary to have this whole group composing the team.

Team Actions

They intend to promote health, educational activities emphasizing lifestyle changes, correction of risk factors and production of educational material; training of professionals; referrals to other professionals, when appropriate; individual and group assistance; participation in research projects; program management.

Individual Actions

Actions characteristic to each professional; however, there are situations in which the functions are common to more than one professional and they will be performed naturally using uniform language and approach.

Community Programs

Forming leagues and associations of hypertensive patients may increase complicance and become an instrument of pressure with authorities in order to improve the quality of assistance offered to hypertensive patients.

Non-drug Treatment

Measures of better Effectiveness

Reduction of body weight and maintenance of ideal body weight – body mass index (weight in kilograms divided by square value of height in meters) between 20 and 25 kg/m^2, because there is a direct association between body weight and arterial blood pressure [25](**A**).

Reduction of sodium intake – it is healthy to ingest up to 6 g/day, which is the equivalent of 4 shallow coffee spoons of salt (4 g) and 2 g of salt present in natural food; it is important to reduce the amount of salt added to food and to avoid having the salt shaker on the table and eating industrialized food. A regular diet contains between 10-12 g/day of sodium[26](**A**).

Greater potassium intake – a diet rich in vegetables and fruits contains 2-4 g/day and can be helpful to lower blood pressure, as well as preventing arterial hypertension[27](**A**). Salt substitutes containing potassium chloride and a lower amount of sodium chloride (30-50%) are helpful to reduce sodium intake and increase potassium intake.

Reduction of alcoholic beverage consumption[28,29](**D**) [30,31](**B**) [32](**A**) – for alcohol consumers, the ingestion of alcoholic beverages must be limited to 30g of alcohol/day, contained in 600 ml of beer (5% alcohol) or 250 ml of wine (12% alcohol) or 60 ml of distilled drinks (whiskey, vodka, sugar cane liquor - 50% alcohol). This limit must be reduced to half in men with low body weight, women, overweight individuals or those who have high levels of triglycerides.

Regular physical activities [33](**A**) [34](**D**) – there is an inverse relationship between the level of physical activity and the incidence of hypertension; regular physical activity reduces blood pressure (Table 5).

Measures without Definitive Scientific Evaluation

Calcium supplements [36,37](**A**), magnesium[38](**D**), vegetarian diets and anti-stress measures.

Associated Measures

Quit smoking – this must be recommended because of its association with a higher incidence of cardiovascular mortality, and increased levels of arterial pressure measured on an outpatient basis [39-41](**B**). Smoke quitting must be accompanied by caloric restriction and increase in physical activity in order to avoid possible weight gain. Exposure to smoke, passive smoking, is also a cardiovascular risk factor which must be avoided[42](**D**).

Control of diabetes and dyslipidemias – glucose into-

Table 5 – Physical activity recommendation[3]

Populational recommendations

An adult individual should practice at least 30 minutes of mild to moderate physical activity in a continuous or accumulated mode most days of the week (**B**), implementing small changes to the daily routine, such as: using the stairs instead of the elevator, walking instead of driving the car, and practicing leisure activities, such as dancing.

Individualized recommendations

Type: dynamic exercise (long walks, running, cycling, dancing, swimming) (**A**)

Frequency: 3-5 times/week (**B**)

Duration: 30-60 minutes in a continuous mode (individuals with borderline blood pressure or obesity: 50-60 minutes) (**B**)

Moderate intensity (B) established:

• simple: able to talk during exercise

• precise: control the heart rate (HR) during exercise:

- sedentary - % HR reserve (heart rate reserve) recommended = 50 and 70%

- conditioned - % HR reserve (heart rate reserve) recommended = 60 and 80%

To calculate the training heart rate, use the formula:

• Training Heart Rate = (HRmax - HRrest) x % recommended HR reserve + HRrest

• HR reserve = HRmax - HRrest

• Maximum HR (HRmax) = measured during treadmill stress test or calculated by 220 – age

• Resting HR (HRrest) = measured after 5 minutes of rest with patient in supine position

Resistance exercise:

They can be done, but should be performed in association with aerobic exercises because their effects on the prevention of hypertension are not conclusive (**D**).

Notice: table updated compared to the original document.

lerance and diabetes are frequently associated with arterial hypertension, causing the occurrence of cardiovascular diseases and complications from diabetes [43](**A**) [44](**B**). Prevention is based mainly on a hypocaloric diet, regular practice of aerobic physical activities and reduction of simple sugar intake. These measures also intend to keep arterial blood pressure below 130/80 mmHg [45](**D**). Hypercholesterolemia and e hypertriglyceridemia, with low HDL-cholesterol, are important cardiovascular risk factors [45](**D**).

The basis for controlling dyslipidemias is represented by dietary changes with reduction of fat intake and partial replacement of saturated fats by mono- and polyunsaturated fats, as well as reduction of daily cholesterol intake [46](**D**).

Avoid medications that increase arterial blood pressure levels [23](**D**), listed on Table 6 along with specific guidelines for each type of medication.

Drug Treatment

Objective – To reduce cardiovascular morbidity and mortality in hypertensive patients. The objective is reached in patients treated with diuretics [47](**A**), beta blockers [47](**D**), angiotensine-converting enzyme (ECA) inhibitors [48](**A**), antagonists of AT1 receptor of angiotensina II – (AII) [49](**D**) and in older patients who use calcium channel antagonists [48](**A**); the majority of the studies ended up using an association of drugs.

Table 6 – Drugs that can raise blood pressure and its treatment [23](D)

Drugs that raise blood pressure	Recommended therapy
Corticoids	ACE inhibitor, Prazosin
Cyclosporin	ACE inhibitor, calcium channel antagonist, clonidine
Amphetamines, cocaine and derivates (acute use)	Consider as an adrenergic crisis
Erythropoietin, antiinflammatory, anorexigenics, contraceptives, antidepressants	Conventional Treatment, adjust doses or associate

Target of Arterial Blood Pressure Reduction

It should be at least to values below 140/90 mmHg [20](**D**). Reductions to levels below 130/85 mmHg provide greater benefit [20](**D**) to patients with high cardiovascular risk [43](**A**), diabetic patients especially with microalbuminuria [50](**A**) and heart failure, nephropathy and in primary and secondary prevention of stroke [48](**A**).

General Principles of Drug Treatment (D):

- The drug must be effective orally, be well tolerated and allow the smallest possible amount of daily doses;
- With stage 1 patients, treatment should start with the lowest effective doses possible;
- With patients In stages 2 and 3, consider the associated use of an anti-hypertensive drug to start the treatment;
- Observe a minimum of four weeks before increasing the dose, replacing monotherapy or changing the drug association;
- Explain the patient about the disease, treatment plans and objectives, the importance of complying with the treatment, and adverse effects associated with the drugs;
- Consider socioeconomic conditions.

Therapeutic Planning

Treatment must be individualized and should maintain the patient's quality of life. Any group of antihypertensive drugs, except direct-acting vasodilators and alpha-blockers, is appropriate to control arterial blood pressure as initial monotherapy (Table 7) [23](**D**). Antihypertensive agents available in Brazil are shown on Tables 8 e 9.

Chlorthalidone has shown to be superior to doxazosin as an initial treatment drug for older hypertensive patients with other risk factors [50](**D**) [51](**A**).

Table 7 – Flow chart for the treatment of arterial hypertension [23](D)

Monotherapy	Drug associations				
Stage 1 Diuretic Beta-blocker ACE inhibitor Calcium channel antagonist Angiotensin II type 1 receptor (AT1) antagonist	Different classes in low doses, mainly for stages 2 and 3				
Inappropriate response or adverse effects					
Increase the dose	Substitute monotherapy	Add 2nd drug	Increase the dose of association	Change the association	Add 3rd drug
Inappropriate Response Add other anti-hypertensive drugs					

ACE = angiotensina-converting enzyme; AII = angiotensine II.

Table 8 – Anti-hypertensive drugs available in Brazil

Medications	Dosage (mg) Minimum	Maximum	Number of doses/day
Diuretics			
Thiazides			
Chlorthalidone	12.5	25	1
Hydrochlorothiazide	12.5	50	1
Indapamide	2.5	5	1
Indapamide SR	1.5	3	1
Loop			
Bumetanide	0.5	**	1-2
Furosemide	20	**	1-2
Piretanide	6	12	1
Potassium-sparing			
Amiloride (in association)	2.5	5	1
Spironolactone	50	100	1-3
Triamterene (in association)	50	150	1
Adrenergic Inhibitors			
Central Action			
Alpha methyldopa	250	1,500	2-3
Clonidine	0.1	0.6	2-3
Guanabenz	4	12	2-3
Moxonidine	0.2	0.4	1
Rilmenidine	1	2	1
Alpha1-blockers			
Doxazosin (urodynamics)	2	4	2-3
Prazosin	1	10	2-3
Trimazosin (urodynamics)	2	10	2-3
Beta-blockers			
Atenolol	25	100	1-2
Bisoprolol	2.5	10	1-2
Metoprolol	50	200	1-2
Nadolol	20	80	1-2
Propranolol	40	240	2-3
Pindolol (with ISA)	5	20	1-3
Direct Vasodilators			
Hydralazine	50	200	2-3
Minoxidil	2.5	40	2-3
Calcium channel blockers			
Phenylalkylamines			
Verapamil Coer*	120	360	1
Verapamil Retard*	120	480	1-2
Benzothiazepines			
Diltiazem SR* or CD*	120	360	1-2
Dihydropyridines			
Amlodipine	2.5	10	1
Felodipine	5	20	1
Isradipine	2.5	10	2
Lacidipine	4	8	1-2
Nifedipine Oros*	30	60	1
Nifedipine Retard*	20	40	1-2
Nisoldipine	10	30	1
Nitrendipine	20	40	2-3
Lercanidipine	10	20	1
Manidipine	10	20	1
Angiotensin-converting enzyme (ACE) Inhibitors			
Benazepril	5	20	1-2
Captopril	25	150	2-3
Cilazapril	2.5	5	1-2
Delapril	15	30	1-2
Enalapril	5	40	1-2
Fosinopril	10	20	1-2
Lisinopril	5	20	1-2
Quinapril	10	20	1
Perindopril	4	8	1
Ramipril	2.5	10	1-2
Trandolapril	2	4	1
Angiotensin II type 1 receptor (AT1) antagonists			
Candesartan	8	16	1
Irbesartan	150	300	1
Losartan	50	100	1
Telmisartan	40	80	1
Valsartan	80	160	1

* Retard; SR; CD; Coer; Oros: refer to slow releasing and long acting pharmaceutical preparations; ** Variable according to clinical indication. ISA – Intrinsic Sympathomimetic Activity. Notice: table updated compared to the original document.

Table 9 – Fixed-dose combinations of anti-hypertensives available in Brazil

Associations	Dosage (mg)
Beta-blocker + diuretic	
Atenolol + Chlorthalidone	25 + 12.5
	50 + 12.5
	100 + 25
Bisoprolol + Hydrochlorothiazide	2.5 + 6.25
	5 + 6.25
	10 + 6.25
Metoprolol + Hydrochlorothiazide	100 + 12.5
Pindolol + Clopamide	10 + 5
Propranolol + Hydrochlorothiazide	40 + 25
	80 + 25
Adrenergic antagonist (CNS action) + diuretic	
Alpha-methyldopa + Hydrochlorothiazide	250 + 25
Angiotensin-converting enzyme (ACE) Inhibitors + diuretic	
Benazepril + Hydrochlorothiazide	5 + 6.25
	10 + 12.5
Captopril + Hydrochlorothiazide	50 + 25
Cilazapril + Hydrochlorothiazide	5 + 12.5
Enalapril + Hydrochlorothiazide	10 + 25
	20 + 12.5
Fosinopril + Hydrochlorothiazide	10 + 12.5
Lisinopril + Hydrochlorothiazide	10 + 12.5
	20 + 12.5
Perindopril + Indapamide	2 + 0.625
Ramipril + Hydrochlorothiazide	5 + 12.5
Angiotensin II type 1 receptor (AT1) antagonist + diuretic	
Candesartan + Hydrochlorothiazide	16 + 12.5
Irbesartan + Hydrochlorothiazide	150 + 12.5
	300 + 12.5
Losartan + Hydrochlorothiazide	50 + 12.5
	100 + 25
Valsartan + Hydrochlorothiazide	80 + 12.5
	160 + 12.5
Telmisartan + Hydrochlorothiazide	40 + 12.5
	80 + 12.5
Calcium Channel Antagonists + Beta-blocker	
Nifedipine + Atenolol	10 + 25
	20 + 50
Calcium Channel Antagonists + Angiotensin-converting enzyme (ACE) Inhibitors	
Amlodipine + Enalapril	2.5 + 10
	5 + 10
	5 + 20

Notice: table updated compared to the original document.

For the hypertensive patient with arterial blood pressure under control, the association of low doses of acetylsalicylic acid may reduce the occurrence of cardiovascular complications[52] (**A**).

Prevention of Hypertension and Associated Risk Factors

Fighting hypertension means preventing the increase of blood pressure by reducing the risk factors in the overall population and in groups with higher risk of developing the disease within the normal limit values (130 - 139/ 80 - 89 mmHg)[35] (**D**) and those with a family history of hypertension. Hypertension is also stimulated by excessive body

weight[53](**D**), sedentarism[34](**D**), high salt intake[26](**A**), low potassium intake [46](**D**) and excessive alcohol consumption[31](**B**). In the group with bordering normal blood pressure levels, factors such as dyslipidemias, glucose intolerance and diabetes, smoking, menopause and emotional stress[54] (**A**) also contribute to the increase of cardiovascular risk.

Preventive measures include: maintenance of ideal body weight[53](**D**), regular physical activities[35](**D**),reduction in salt intake and increase in potassium intake[46](**D**),avoiding alcoholic beverages[31](**B**), following a healthy diet (Table 10) which should have a low fat content, mainly saturated fats, low cholesterol, high potassium content and fibers[46](**D**), and low sodium content[26](**A**). The total calorie count must be adjusted for the purpose of achieving and keeping the ideal body weight. Strictly watching the entire diet is more important than following up isolated measures[55](**B**).

Table 10 – Dietary Recommendations (D)

Prefer the following:
- Cooked, roasted, grilled or stewed foods.
- Natural spices: lemon, herbs, garlic, parsley and scallions
- Vegetables, fruits, grains, and fibers
- Fish and skinned poultry
- Skim dairy products.

Items to be limited:
- Salt
- Alcohol
- Egg yolk: maximum 3/week
- Seafood
- Margarine; prefer the creamy types, halvarine, rich in phytosterol.

Avoid
- Sugar and sweets.
- Fried food. Whole milk and dairy products containing fat.
- Red meat rich in fat; viscera
- Processed and industrialized food: cold cuts and sausages, preserves, canned and smoked food and salty snacks.

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