



European Society of Hypertension
www.eshonline.org

2013 ESH/ESC Guidelines for the management of arterial hypertension

European Society of Hypertension
European Society of Cardiology

Journal of Hypertension 2013;31:1281-1357

Definitions and classification of office BP levels (mmHg)*

Hypertension:
SBP >140 mmHg ± DBP >90 mmHg

Category	Systolic		Diastolic
Optimal	<120	and	<80
Normal	120–129	and/or	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

* The blood pressure (BP) category is defined by the highest level of BP, whether systolic or diastolic. Isolated systolic hypertension should be graded 1, 2, or 3 according to systolic BP values in the ranges indicated.

Stratification of total CV risk in categories

Other risk factors, asymptomatic organ damage or disease	Blood pressure (mmHg)			
	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF		Low risk	Moderate risk	High risk
1–2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥3 RF	Low to moderate risk	Moderate to high risk	High risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/RFs	Very high risk	Very high risk	Very high risk	Very high risk

Stratification of total CV risk in categories of low, moderate, high and very high risk according to SBP and DBP and prevalence of RFs, asymptomatic OD, diabetes, CKD stage or symptomatic CVD. Subjects with a high normal office but a raised out-of-office BP (masked hypertension) have a CV risk in the hypertension range. Subjects with a high office BP but normal out-of-office BP (white-coat hypertension), particularly if there is no diabetes, OD, CVD or CKD, have lower risk than sustained hypertension for the same office BP. BP, blood pressure; CKD, chronic kidney disease; CV, cardiovascular; CVD, cardiovascular disease; DBP, diastolic blood pressure; HT, hypertension; OD, organ damage; RF, risk factor; SBP, systolic blood pressure.

Factors—other than office BP—influencing prognosis (used for stratification of total CV risk in prev. slide)

Risk factors

- Male sex
- Age (men ≥ 55 years; women ≥ 65 years)
- Smoking
- Dyslipidaemia
 - Total cholesterol > 4.9 mmol/L (190 mg/dL), and/or
 - Low-density lipoprotein cholesterol > 3.0 mmol/L (115 mg/dL), and/or
 - High-density lipoprotein cholesterol: men < 1.0 mmol/L (40 mg/dL), women < 1.2 mmol/L (46 mg/dL), and/or
 - Triglycerides > 1.7 mmol/L (150 mg/dL)
- Fasting plasma glucose 5.6–6.9 mmol/L (102–125 mg/dL)
- Abnormal glucose tolerance test
- Obesity [BMI ≥ 30 kg/m² (height²)]
- Abdominal obesity (waist circumference: men ≥ 102 cm; women ≥ 88 cm) (in Caucasians)
- Family history of premature CVD (men aged < 55 years; women aged < 65 years)

Diabetes Mellitus

- Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dL) on two repeated measurements, and/or
- HbA_{1c} $> 7\%$ (53 mmol/mol), and/or
- Post-load plasma glucose > 11.0 mmol/L (198 mg/dL)

Asymptomatic organ damage

- Pulse pressure (in the elderly) ≥ 60 mmHg
- Electrocardiographic LVH (Sokolow–Lyon index > 3.5 mV; RaVL > 1.1 mV; Cornell voltage duration product > 244 mV*ms), or
- Echocardiographic LVH [LVM index: men > 115 g/m²; women > 95 g/m² (BSA)]^a
- Carotid wall thickening (IMT > 0.9 mm) or plaque
- Carotid-femoral PWV > 10 m/s
- Ankle/brachial BP index < 0.9
- CKD with eGFR 30–60 ml/min/1.73 m² (BSA)
- Microalbuminuria (30–300 mg/24 h), or albumin–creatinine ratio (30–300 mg/g; 3.4–34 mg/mmol) (preferentially on morning spot urine)

Established CV or renal disease

- Cerebrovascular disease: ischaemic stroke; cerebral haemorrhage; transient ischaemic attack
- CHD: myocardial infarction; angina; myocardial revascularization with PCI or CABG
- Heart failure, including heart failure with preserved EF
- Symptomatic lower extremities peripheral artery disease
- CKD with eGFR < 30 mL/min/1.73m² (BSA); proteinuria (> 300 mg/24 h)
- Advanced retinopathy: haemorrhages or exudates, papilloedema

BMI, body mass index; BP, blood pressure; BSA, body surface area; CABG, coronary artery bypass graft; CHD, coronary heart disease; CKD, chronic kidney disease; CV, cardiovascular; CVD, cardiovascular disease; EF, ejection fraction; eGFR, estimated glomerular filtration rate; HbA_{1c}, glycated haemoglobin; IMT, intima-media thickness; LVH, left ventricular hypertrophy; LVM, left ventricular mass; PCI, percutaneous coronary intervention; PWV, pulse wave velocity.

^a Risk maximal for concentric LVH: increased LVM index with a wall thickness/radius ratio of 0.42.

Individuals at higher CV risk - Summary

Population at higher CV risk than indicated in stratification chart:

- Sedentary subjects and those with central obesity
- Socially deprived subjects and those from ethnic minorities
- Subjects with elevated FPG and/or abnormal glucose tolerance test*
- Persons with increased TG, fibrinogen, apoB, lp(a), hs-CRP
- Individuals with family history of premature CVD[^]

* Do not meet diabetes diagnostic criteria. [^] Men aged ≤ 55 yrs, women aged ≤ 65 yrs.
apoB, apolipoprotein B; FPG, fasting plasma glucose; hs-CRP, high-sensitivity C-reactive protein; lp(a), lipoprotein(a).

Diagnostic evaluation

Initial evaluation should:

- Confirm hypertension diagnosis
- Detect causes of secondary hypertension
- Assess CV risk, organ damage, and comorbidities

Action steps:

- Measure BP
- Obtain medical history, including family history
- Perform physical examination and laboratory tests
- Perform further diagnostic tests

* BP, blood pressure; CV, cardiovascular.

Office BP measurement

When measuring BP in the office, care should be taken:

- To allow the patients to sit for 3–5 minutes before beginning BP measurements
- To take at least two BP measurements, in the sitting position, spaced 1–2 min apart, and additional measurements if the first two are quite different. Consider the average BP if deemed appropriate
- To take repeated measurements of BP to improve accuracy in patients with arrhythmias, such as atrial fibrillation
- To use a standard bladder (12–13 cm wide and 35 cm long), but have a larger and a smaller bladder available for large (arm circumference >32 cm) and thin arms, respectively
- To have the cuff at the heart level, whatever the position of the patient
- When adopting the auscultatory method, use phase I and V (disappearance) Korotkoff sounds to identify systolic and diastolic BP, respectively
- To measure BP in both arms at first visit to detect possible differences. In this instance, take the arm with the higher value as the reference
- To measure at first visit BP 1 and 3 min after assumption of the standing position in elderly subjects, diabetic patients, and in other conditions in which orthostatic hypotension may be frequent or suspected
- To measure, in case of conventional BP measurement, heart rate by pulse palpation (at least 30 s) after the second measurement in the sitting position

BP, blood pressure.

Definitions of hypertension by office and out-of-office BP levels

Category	Systolic BP (mmHg)		Diastolic BP (mmHg)
Office BP	≥140	and	≥90
Ambulatory BP			
Daytime (or awake)	≥135	and/or	≥85
Nighttime (or asleep)	≥120	and/or	≥70
24-h	≥130	and/or	≥80
Home BP	≥135	and/or	≥85

BP, blood pressure.

Clinical indications for out-of-office BP measurement for diagnostic purposes

Clinical indications for HBPM or ABPM

- Suspicion of white-coat hypertension
 - Grade I hypertension in the office
 - High office BP in individuals without asymptomatic organ damage and at low total CV risk
- Suspicion of masked hypertension
 - High normal BP in the office
 - Normal office BP in individuals with asymptomatic organ damage or at high total CV risk
- Identification of white-coat effect in hypertensive patients
- Considerable variability of office BP over the same or different visits
- Autonomic, postural, post-prandial, siesta- and drug-induced hypotension
- Elevated office BP or suspected pre-eclampsia in pregnant women
- Identification of true and false resistant hypertension

Specific indications for ABPM

- Marked discordance between office BP and home BP
- Assessment of dipping status
- Suspicion of nocturnal hypertension or absence of dipping, such as in patients with sleep apnoea, CKD, or diabetes
- Assessment of BP variability

BP, blood pressure; ABPM, ambulatory blood pressure monitoring; HBPM, home blood pressure monitoring; CKD, chronic kidney disease; CV, cardiovascular.

Personal and family medical history

1. Duration and previous level of high BP (including measurements at home)	
2. Secondary hypertension	<ul style="list-style-type: none"> • Family history of chronic kidney disease • History of renal disease, urinary tract infection, haematuria, analgesic abuse • Drug/substance use • Recurrent episodes of sweating, headache, anxiety, palpitations • Episodes of muscle weakness and tetany • Symptoms suggestive of thyroid disease
3. Risk factors	<ul style="list-style-type: none"> • Family and personal history of HTN and CVD, dyslipidaemia, diabetes • Smoking • Dietary habits • Recent weight changes; obesity • Amount of physical exercise • Snoring; sleep apnoea • Low birth-weight
4. History and symptoms of organ damage and CVD	<ul style="list-style-type: none"> • Brain and eyes • Heart • Kidney • Peripheral arteries • History of snoring/chronic lung disease/sleep apnoea • Cognitive dysfunction
5. Hypertension management	<ul style="list-style-type: none"> • Current and past antihypertensive medication • Evidence of adherence or lack of adherence to therapy • Efficacy and adverse effects of drugs

BP, blood pressure; HTN, hypertension; CVD, cardiovascular disease; TIA, transient ischaemic attack.

Physical examination for secondary hypertension, organ damage and obesity

1. Signs suggesting secondary hypertension	<ul style="list-style-type: none">• Features of Cushing syndrome• Skin stigmata of neurofibromatosis• Palpation of enlarged kidneys• Auscultation of abdominal murmurs• Auscultation of precordial or chest murmurs• Diminished and delayed femoral pulses• Left–right arm BP difference
2. Signs of organ damage	<ul style="list-style-type: none">• Brain: motor or sensory defects• Retina: fundoscopic abnormalities• Heart: heart rate, 3rd or 4th heart sound, murmurs, arrhythmias, location of apical impulse, pulmonary rales, peripheral oedema• Peripheral arteries: absence, reduction, or asymmetry of pulses, cold extremities, ischaemic skin lesions• Carotid arteries: systolic murmurs
3. Evidence of obesity	<ul style="list-style-type: none">• Weight and height• Calculate BMI• Waist circumference

BP, blood pressure; BMI, body mass index;

Laboratory investigations

Confirm additional risk factors, secondary hypertension, absence or presence of organ damage

1. Routine tests	Haemoglobin and/or haematocrit FGP TC, LDL-C, HDL-C, TG Serum potassium and sodium	Serum uric acid Serum creatinine (include eGFR) Urine analysis 12-lead ECG
2. Additional tests	HbA _{1c} if FGP >5.6 mmol/L (102 mg/dL) or previous diabetes diagnosis Quantitative proteinuria Home and 24-h ambulatory BP monitoring Echocardiogram Holter monitoring for arrhythmias	Carotid ultrasound Peripheral artery/abdominal ultrasound Pulse wave velocity Ankle-brachial index Fundoscopy
3. Extended evaluation	Cerebral, cardiac, renal, and vascular damage; mandatory in resistant and complicated hypertension Secondary hypertension when suggested by history, physical examination, or routine and additional tests	

FGP, Fasting plasma glucose; TC, serum total cholesterol; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides; HbA_{1c}, haemoglobin A1c; BP, blood pressure; ECG, electrocardiogram; eGFR, estimated glomerular filtration rate.

Predictive value, availability, reproducibility and cost-effectiveness of some markers of organ damage

Marker	CV predictive value	Availability	Reproducibility	Cost effectiveness
Electrocardiography	+++	++++	++++	++++
Echocardiography, plus Doppler	++++	+++	+++	+++
Estimated glomerular filtration rate	+++	++++	++++	++++
Microalbuminuria	+++	++++	++	++++
Carotid intima-media thickness and plaque	+++	+++	+++	+++
Arterial stiffness (pulse wave velocity)	+++	++	+++	+++
Ankle-brachial index	+++	+++	+++	+++
Fundoscopy	+++	++++	++	+++

Additional measurements

Coronary calcium score	++	+	+++	+
Endothelial dysfunction	++	+	+	+
Cerebral lacunae/white matter lesions	++	+	+++	+
Cardiac magnetic resonance	++	+	+++	++

CV, cardiovascular. Scores are from + to ++++.

Clinical indications and diagnostics of secondary hypertension

	CLINICAL INDICATIONS		DIAGNOSTICS		
Common causes	Clinical history	Physical examination	Laboratory investigations	First-line test(s)	Additional/confirmatory test(s)
Renal parenchymal disease	History of urinary tract infection or obstruction, haematuria, analgesic abuse; family history of polycystic kidney disease	Abdominal masses (in case of polycystic kidney disease)	Presence of protein, erythrocytes, or leucocytes in the urine, decreased GFR	Renal ultrasound	Detailed work-up for kidney disease
Renal artery stenosis	- Fibromuscular dysplasia: early onset hypertension (especially in women) - Atherosclerotic stenosis: hypertension of abrupt onset, worsening or increasingly difficult to treat; flash pulmonary oedema	Abdominal bruit	Difference of >1.5 cm in length between the two kidneys (renal ultrasound), rapid deterioration in renal function (spontaneous or in response to RAA blockers)	Renal Duplex Doppler ultrasonography	Magnetic resonance angiography, spiral computed tomography, intra-arterial digital subtraction angiography
Primary aldosteronism	Muscle weakness; family history of early onset hypertension and cerebrovascular events at age <40 years	Arrhythmias (in case of severe hypokalaemia)	Hypokalaemia (spontaneous or diuretic-induced); incidental discovery of adrenal masses	Aldosterone–renin ratio under standardized conditions (correction of hypokalaemia and withdrawal of drugs affecting RAA system)	Confirmatory tests (oral sodium loading, saline infusion, fludrocortisone suppression, or captopril test); adrenal CT scan; adrenal vein sampling
Uncommon causes					
Pheochromocytoma	Paroxysmal hypertension or a crisis superimposed to sustained hypertension; headache, sweating, palpitations and pallor; positive family history of pheochromocytoma	Skin stigmata of neurofibromatosis (café-au-lait spots, neurofibromas)	Incidental discovery of adrenal (or in some cases, extra-adrenal) masses	Measurement of urinary fractionated metanephrines or plasma-free metanephrines	CT or MRI of the abdomen and pelvis; ¹²³ I-labelled metaiodoben-zyl-guanidine scanning; genetic screening for pathogenic mutations
Cushing's syndrome	Rapid weight gain, polyuria, polydipsia, psychological disturbances	Typical body habitus (central obesity, moon-face, buffalo hump, red striae, hirsutism)	Hyperglycaemia	24-h urinary cortisol excretion	Dexamethasone-suppression tests

CT, computed tomography; GFR, glomerular filtration rate; MRI, magnetic resonance imaging; RAA, renin–angiotensin–aldosterone.

Initiation of lifestyle changes and antihypertensive drug treatment

Other risk factors, asymptomatic organ damage or disease	Blood pressure (mmHg)			
	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF	• No BP intervention	• Lifestyle changes for several months • Then add BP drugs targeting <140/90	• Lifestyle changes for several weeks • Then add BP drugs targeting <140/90	• Lifestyle changes • Immediate BP drugs targeting <140/90
1–2 RF	• Lifestyle changes • No BP intervention	• Lifestyle changes for several weeks • Then add BP drugs targeting <140/90	• Lifestyle changes for several weeks • Then add BP drugs targeting <140/90	• Lifestyle changes • Immediate BP drugs targeting <140/90
≥3 RF	• Lifestyle changes • No BP intervention	• Lifestyle changes for several weeks • Then add BP drugs targeting <140/90	• Lifestyle changes • BP drugs targeting <140/90	• Lifestyle changes • Immediate BP drugs targeting <140/90
OD, CKD stage 3 or diabetes	• Lifestyle changes • No BP intervention	• Lifestyle changes • BP drugs targeting <140/90	• Lifestyle changes • BP drugs targeting <140/90	• Lifestyle changes • Immediate BP drugs targeting <140/90
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/RFs	• Lifestyle changes • No BP intervention	• Lifestyle changes • BP drugs targeting <140/90	• Lifestyle changes • BP drugs targeting <140/90	• Lifestyle changes • Immediate BP drugs targeting <140/90

BP, blood pressure; CKD, chronic kidney disease; CV, cardiovascular; CVD, cardiovascular disease; DBP, diastolic blood pressure; HT, hypertension; OD, organ damage; RF, risk factor; SBP, systolic blood pressure.

Blood pressure goals in hypertensive patients

Recommendations	
SBP goal for “most” •Patients at low–moderate CV risk •Patients with diabetes •Consider with previous stroke or TIA •Consider with CHD •Consider with diabetic or non-diabetic CKD	<140 mmHg
SBP goal for elderly •Ages <80 years •Initial SBP ≥160 mmHg	140-150 mmHg
SBP goal for fit elderly Aged <80 years	<140 mmHg
SBP goal for elderly >80 years with SBP •≥160 mmHg	140-150 mmHg
DBP goal for “most”	<90 mmHg
DB goal for patients with diabetes	<85 mmHg

SBP, systolic blood pressure; CV, cardiovascular; TIA, transient ischaemic attack; CHD, coronary heart disease; CKD, chronic kidney disease; DBP, diastolic blood pressure.

Lifestyle changes for hypertensive patients

Recommendations to reduce BP and/or CV risk factors	
Salt intake	Restrict 5-6 g/day
Moderate alcohol intake	Limit to 20-30 g/day men, 10-20 g/day women
Increase vegetable, fruit, low-fat dairy intake	
BMI goal	25 kg/m ²
Waist circumference goal	Men: <102 cm (40 in.)* Women: <88 cm (34 in.)*
Exercise goals	≥30 min/day, 5-7 days/week (moderate, dynamic exercise)
Quit smoking	

* Unless contraindicated. BMI, body mass index.

Compelling indications for hypertension treatment

Class	Contraindications	
	Compelling	Possible
Diuretics (thiazides)	Gout	Metabolic syndrome Glucose intolerance Pregnancy Hypercalcemia Hypokalaemia
Beta-blockers	Asthma A–V block (grade 2 or 3)	Metabolic syndrome Glucose intolerance Athletes and physically active patients COPD (except for vasodilator beta-blockers)
Calcium antagonists (dihydropyridines)		Tachyarrhythmia Heart failure
Calcium antagonists (verapamil, diltiazem)	A–V block (grade 2 or 3, trifascicular block) Severe LV dysfunction Heart failure	
ACE inhibitors	Pregnancy Angioneurotic oedema Hyperkalaemia Bilateral renal artery stenosis	Women with child bearing potential
Angiotensin receptor blockers	Pregnancy Hyperkalaemia Bilateral renal artery stenosis	Women with child bearing potential
Mineralocorticoid receptor antagonists	Acute or severe renal failure (eGFR <30 mL/min) Hyperkalaemia	

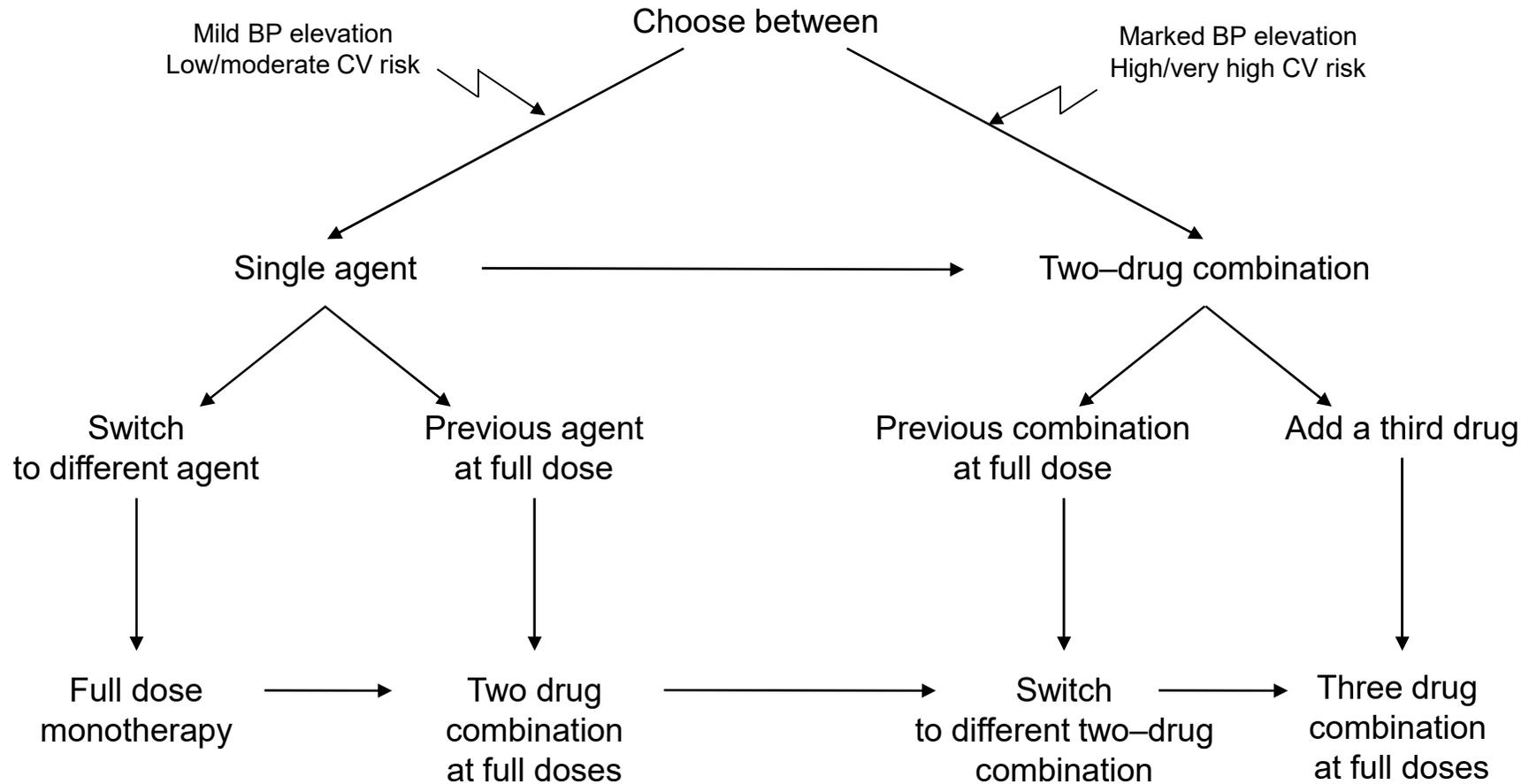
A-V, atrio-ventricular; COPD, chronic obstructive pulmonary disease; eGFR, estimated glomerular filtration rate; LV, left ventricular.

Preferred hypertension treatment in specific conditions

Condition	Drug
Asymptomatic organ damage	
LVH	LVH ACE inhibitor, calcium antagonist, ARB
Asymptomatic atherosclerosis	Calcium antagonist, ACE inhibitor
Microalbuminuria	ACE inhibitor, ARB
Renal dysfunction	ACE inhibitor, ARB
Clinical CV event	
Previous stroke	Any agent effectively lowering BP
Previous myocardial infarction	BB, ACE inhibitor, ARB
Angina pectoris	BB, calcium antagonist
Heart failure	Diuretic, BB, ACE inhibitor, ARB, mineralocorticoid receptor antagonists
Aortic aneurysm	BB
Atrial fibrillation, prevention	Consider ARB, ACE inhibitor, BB or mineralocorticoid receptor antagonist
Atrial fibrillation, ventricular rate control	BB, non-dihydropyridine calcium antagonist
ESRD/proteinuria	ACE inhibitor, ARB
Peripheral artery disease	ACE inhibitor, calcium antagonist
Other	
ISH (elderly)	Diuretic, calcium antagonist
Metabolic syndrome	ACE inhibitor, ARB, calcium antagonist
Diabetes mellitus	ACE inhibitor, ARB
Pregnancy	Methyldopa, BB, calcium antagonist
Blacks	Diuretic, calcium antagonist

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BB, beta-blocker; BP, blood pressure; CV, cardiovascular; ESRD, end-stage renal disease; ISH, isolated systolic hypertension; LVH, left ventricular hypertrophy.

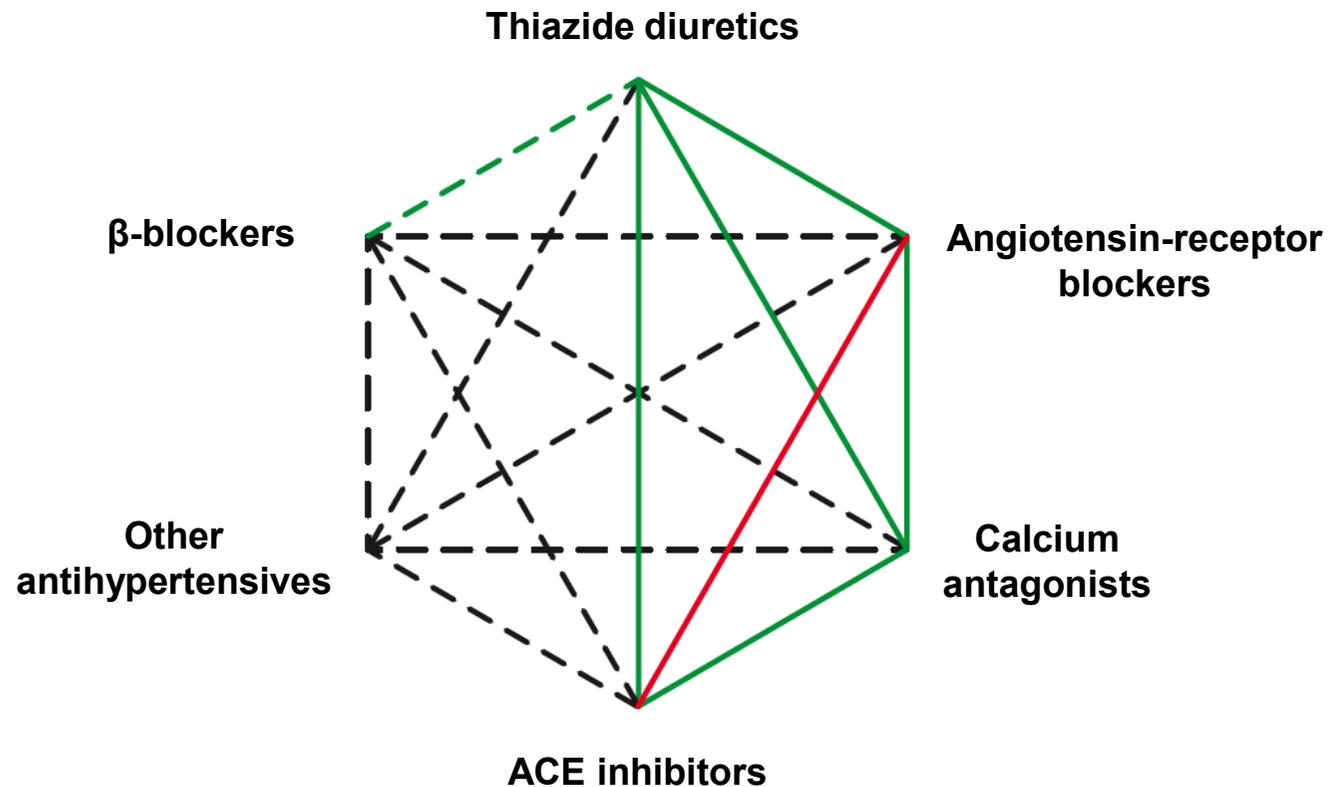
Monotherapy vs. drug combination strategies to achieve target BP



Moving from a less intensive to a more intensive therapeutic strategy should be done whenever BP target is not achieved.

BP, blood pressure; CV, cardiovascular.

Possible combinations of classes of antihypertensive drugs



Green continuous lines: preferred combinations; **green dashed line:** useful combination (with some limitations); **black dashed lines:** possible but less well tested combinations; **red continuous line:** not recommended combination. Although verapamil and diltiazem are sometimes used with a beta-blocker to improve ventricular rate control in permanent atrial fibrillation, only dihydropyridine calcium antagonists should normally be combined with beta-blockers.

Hypertension treatment options

Clinical scenario	Recommendations
Initiation and maintenance treatment <i>Monotherapy or in combination</i>	<ul style="list-style-type: none"> • Diuretics (thiazides, chlorthalidone, indapamide) • BBs • CCBs • ACE-I • ARBs
Consider some agents as preferential choice in specific conditions due to:	<ul style="list-style-type: none"> • Use in trials in those conditions • Great effectiveness in specific types of OD
Consider two-drug combination therapy in patient with:	<ul style="list-style-type: none"> • High baseline BP • High CV risk
Combination of two RAS antagonists	<i>Not recommended</i>
Consider other drug combinations for BP reduction	Most preferable option may be combinations successfully used in trial
Combination therapy with fixed doses of two drugs in a single tablet	May be recommended due to potential for improved adherence

BB, beta-blocker; CCB, calcium channel blockers; ACE-I, angiotensin-converting-enzyme inhibitor; ARB, angiotensin receptor blocker; OD, organ damage; BP, blood pressure; CV, cardiovascular; RAS, renin-angiotensin system.

Treatment for masked and white-coat hypertension

Recommendations

Maked hypertension

- Consider both lifestyle measures and antihypertensive drug treatment

White-coat hypertension

- No additional risk factors: lifestyle changes only with close follow-up
- High CV risk*: consider drug treatment in addition to lifesyle changes

* Due to metabolic derangement or asymptomatic organ damage. CV, cardiovascular.

Hypertension treatment in the elderly

Clinical scenario	Recommendations
Elderly patients with SBP ≥ 160 mmHg	<ul style="list-style-type: none"> Reduce SBP to 140-150 mmHg
Fit elderly patients aged < 80 years with initial SBP ≥ 140 mmHg	<ul style="list-style-type: none"> Consider antihypertensive treatment Target SBP: < 140 mmHg
Elderly > 80 years with initial SBP ≥ 160 mmHg	<ul style="list-style-type: none"> Reduce SBP to 140-150 mmHg <i>providing in good physical and mental condition</i>
Frail elderly	<ul style="list-style-type: none"> Hypertension treatment decision at discretion of treating clinician, based on monitoring of treatment clinical effects
Continuation of well- tolerated hypertension treatment	<ul style="list-style-type: none"> Consider when patients become octogenarians
All hypertension treatment agents are recommended and may be used in elderly	<ul style="list-style-type: none"> Diuretics, CCBs, preferred for isolated systolic hypertension

SBP, systolic blood pressure; CCB, calcium channel blockers.

Hypertension treatment for women

Clinical scenario	Recommendations
Hormone therapy and selective estrogen receptor modulators	<ul style="list-style-type: none"> • <i>Not recommended; should be used for primary or secondary CVD prevention</i>
If treatment of younger perimenopausal women is considered for severe menopausal symptoms	<ul style="list-style-type: none"> • Weigh risk/benefit profile
Drug treatment of severe hypertension in pregnancy (SBP >160 mmHg or DBP >110 mmHg)	<ul style="list-style-type: none"> • <i>Recommended</i>
Pregnant women with persistent BP elevations $\geq 150/95$ mmHg BP $\geq 140/90$ mmHg in presence of gestational hypertension, subclinical OD, or symptoms	<ul style="list-style-type: none"> • Consider drug treatment
High risk of pre-eclampsia	<ul style="list-style-type: none"> • Consider treating with low-dose aspirin from 12 weeks until delivery • <i>Providing low risk of GI hemorrhage</i>
Women with child-bearing potential	<ul style="list-style-type: none"> • <i>RAS blockers not recommended</i>
Methyldopa, labetalol, nifedipine	<ul style="list-style-type: none"> • Consider as preferential drugs in pregnancy • For pre-eclampsia: intravenous labetalol or infusion of nitroprusside

SBP, systolic blood pressure; DBP, diastolic blood pressure; BP, blood pressure; OD, organ damage; CVD, cardiovascular disease; GI, gastrointestinal; RAS, renin-angiotensin system.

Hypertension treatment for people with diabetes

Recommendations	Additional considerations
Mandatory: initiate drug treatment in patients with SBP \geq 160 mmHg	<ul style="list-style-type: none"> Strongly recommended: start drug treatment when SBP \geq140 mmHg
SBP goals for patients with diabetes: <140 mmHg	
DBP goals for patients with diabetes: <85 mmHg	
All hypertension treatment agents are recommended and may be used in patients with diabetes	<ul style="list-style-type: none"> RAS blockers may be preferred <i>Especially in presence of preteinuria or microalbuminuria</i>
Choice of hypertension treatment must take comorbidities into account	
Coadministration of RAS blockers <i>not recommended</i>	<ul style="list-style-type: none"> <i>Avoid in patients with diabetes</i>

SBP, systolic blood pressure; DBP, diastolic blood pressure; RAS, renin–angiotensin system.

Hypertension treatment for people with metabolic syndrome

Recommendations	Additional considerations
Lifestyle changes for all	<ul style="list-style-type: none"> • Especially weight loss and physical activity • <i>Improve BP and components of metabolic syndrome, delay diabetes onset</i>
Antihypertensive agents that potentially improve – or not worsen – insulin sensitivity are recommended	<ul style="list-style-type: none"> • RAS blockers • CCBs
BBs and diuretics only as additional drugs	<ul style="list-style-type: none"> • Preferably in combination with a potassium-sparing agent
Prescribe antihypertensive drugs with particular care in patients with metabolic disturbances when...	<ul style="list-style-type: none"> • BP \geq140/90 mmHg after lifestyle changes to maintain BP <140/90 mmHg
No drug treatment in patients with metabolic syndrome and high normal BP	

BP, blood pressure; BB, beta blockers; CCB, calcium channel blockers; RAS, renin–angiotensin system.

Hypertension treatment for people with nephropathy

Recommendations	Additional considerations
Consider lowering SBP to <140 mmHg	
Consider SBP <130 mmHg with overt proteinuria	<ul style="list-style-type: none"> • Monitor changes in eGFR
RAS blockers more effective to reduce albuminuria than other agents	<ul style="list-style-type: none"> • Indicated in presence of microalbuminuria or overt proteinuria
Combination therapy usually required to reach BP goals	<ul style="list-style-type: none"> • Combine RAS blockers with other agents
Combination of two RAS blockers	<ul style="list-style-type: none"> • <i>Not recommended</i>
Aldosterone antagonist <i>not recommended in CKD</i>	<ul style="list-style-type: none"> • Especially in combination with a RAS blocker • Risk of excessive reduction in renal function, hyperkalemia

SBP, systolic blood pressure; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; RAS, renin–angiotensin system.

Hypertension treatment for people with cerebrovascular disease

Recommendations	Additional considerations
Do not introduce antihypertensive treatment during first week after acute stroke	<ul style="list-style-type: none"> • Irrespective of BP level • <i>Use clinical judgment with very high SBP</i>
Introduce antihypertensive treatment in patients with history of stroke or TIA	<ul style="list-style-type: none"> • Even when initial SBP is 140-159 mmHg
SBP goals for hypertensive patients with history of stroke or TIA: <140 mmHg	
Consider higher SBP goal in elderly with previous stroke or TIA	
All drug regimens recommended for stroke prevention	<ul style="list-style-type: none"> • Provided BP is effectively reduced

TIA, transient ischaemic attack; SBP, systolic blood pressure; BP, blood pressure.

Hypertension treatment for people with heart disease

Recommendations	Additional considerations
SBP goals for hypertensive patients with CHD: <140 mmHg	
BBs for hypertensive patients with recent MI	<ul style="list-style-type: none"> • Other CHD: other antihypertensive agents can be used; BBs, CCBs preferred
Diuretics, BBs, ACE-I, ARBs, and/or mineralcorticoid receptor antagonist for patients with heart failure or severe LV dysfunction	<ul style="list-style-type: none"> • Reduce mortality and hospitalization
No evidence that any hypertension drug beneficial for patients with heart failure and preserved EF	<ul style="list-style-type: none"> • However, in these patients and patients with hypertension and systolic dysfunction: consider lowering SBP to ~ 140 mmHg • Guide treatment by symptom relief
Consider ACE-I and ARBs (and BBs and mineralcorticoid receptor antagonist in coexisting heart failure) in patients at risk of new or recurrent AF	
Antihypertensive therapy in all patients with LVH	<ul style="list-style-type: none"> • Initiate treatment with an agent with greater ability to regress LVH (ACE-I, ARBs, CCBs)

SBP, systolic blood pressure; BB, beta-blocker; MI, myocardial infarction; ACE-I, angiotensin-converting-enzyme inhibitor; ARB, angiotensin receptor blocker; LV, left ventricular; EF, ejection fraction; CHD, coronary heart disease; CCB, calcium channel blockers; AF, atrial fibrillation; LVH, left ventricular hypertrophy.

Hypertension treatment for people with atherosclerosis, arteriosclerosis, and PAD

Recommendations	Additional considerations
Consider CCBs and ACE-I in presence of carotid atherosclerosis	<ul style="list-style-type: none"> • Greater efficacy in delaying atherosclerosis than diuretics, BBs
All antihypertensive drugs considered for hypertensive patients with PWV >10 m/s	<ul style="list-style-type: none"> • Providing that reduction to <140/90 mmHg consistently achieved
Drug therapy in hypertensive patients with PAD to BP target: <140 mmHg	<ul style="list-style-type: none"> • Patients with PAD have high risk of MI, stroke, heart failure, CV death
Consider BBs for treating arterial hypertension in patients with PAD	<ul style="list-style-type: none"> • Careful follow-up necessary • Use of BBs not associated with exacerbation of PAD symptoms

PAS, peripheral artery disease; CCB, calcium channel blockers; ACE-I, angiotensin-converting-enzyme inhibitor; PWV, pulse wave velocity; BP, blood pressure; BB, beta-blocker; MI, myocardial infarction; CV, cardiovascular.

Hypertension treatment for people with resistant hypertension

Recommendations	Additional considerations
<p>Withdraw any drugs in antihypertensive treatment regimen that have absent or minimal effect</p>	
<p>Consider mineralocorticoid receptor antagonists, amiloride, and the alpha-1-blocker doxazosin should be considered (if no contraindication exists)</p>	<ul style="list-style-type: none"> • <i>If no contraindications exist</i>
<p>Invasive approaches: renal denervation and baroreceptor stimulation may be considered</p>	<ul style="list-style-type: none"> • If drug treatment ineffective
<p style="text-align: center;"><i>No long-term efficacy, safety data for renal denervation, baroreceptor stimulation – only experienced clinicians should use</i> <i>Diagnosis and follow-up should be restricted to hypertension Centres</i></p>	
<p>Invasive approaches only for truly resistant hypertensive patients</p>	<ul style="list-style-type: none"> • Clinic values: SBP \geq160 mmHg or DBP \geq110 mmHg with BP elevation confirmed by ABPM

SBP, systolic blood pressure; DBP, diastolic blood pressure; BP, blood pressure.

Treatment of risk factors associated with hypertension

Recommendations	Additional considerations
Use statin therapy in hypertensive patients at moderate to high CV risk	<ul style="list-style-type: none"> LDL-C target: <3.0 mmol/L (<115 mg/dL)
Use statin therapy when overt CHD is present	<ul style="list-style-type: none"> LDL-C target: <1.8 mmol/L (<70mg/dL)
Use antiplatelet therapy, in particular low-dose aspirin, for hypertensive patients with previous CV events	
Consider aspirin therapy in hypertensive patients with reduced renal function or High CV risk	<ul style="list-style-type: none"> <i>Providing</i> that BP is well controlled
Aspirin not recommended for CV prevention in low-moderate risk hypertensive patients	<ul style="list-style-type: none"> Benefit and harm are equivalent
For hypertensive patients with diabetes...	<ul style="list-style-type: none"> Treat to a HbA_{1c} target <7.0%
Fragile elderly patients with long diabetes duration, more comorbidities and at high risk...	<ul style="list-style-type: none"> Treat to a HbA_{1c} target <7.5–8.0%

CV, cardiovascular; CHD, coronary heart disease; BP, blood pressure; LDL-C, low-density lipoprotein cholesterol; HbA_{1c}, glycated haemoglobin.