2018 ESC-ESH Guidelines for the Management of Arterial Hypertension

Williams, Mancia et al., J Hypertens 2018;36:1953-2041 and Eur Heart J 2018;39:3021-3104

2018 ESC/ESH Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Cardiology and the European Society of Hypertension

Authors/Task Force Members: Bryan Williams (ESC Chairperson) (UK)*, Giuseppe Mancia (ESH Chairperson) (Italy)*, Wilko Spiering (The Netherlands), Enrico Agabiti Rosei (Italy), Michel Azizi (France), Michel Burnier (Switzerland), Denis L. Clement (Belgium), Antonio Coca (Spain), Giovanni de Simone (Italy), Anna Dominiczak (UK), Thomas Kahan (Sweden), Felix Mahfoud (Germany), Josep Redon (Spain), Luis Ruilope (Spain), Alberto Zanchetti (Italy)†, Mary Kerins (Ireland), Sverre E. Kjeldsen (Norway), Reinhold Kreutz (Germany), Stephane Laurent (France), Gregory Y.H. Lip (UK), Richard McManus (UK), Krzysztof Narkiewicz (Poland), Frank Ruschitzka (Switzerland), Roland E. Schmieder (Germany), Evgeny Shlyakhto (Russia), Costas Tsioufis (Greece), Victor Aboyans (France), and Ileana Desormais (France)

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Classes of recommendations

Classes of recommendations	Definition	Suggested wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/ Is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefullness/efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
Class IIb	Usefullness/efficacy is less well established by evidence/opinion.	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommendend

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Levels of evidence

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

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What is new and what has changed in the 2018 ESC/ESH hypertension guidelines? - 1

Changes in recommendations	
2013	**2018**
Diagnosis Office BP is recommended for screening and diagnosis of hypertension.	**Diagnosis** It is recommended to base the diagnosis of hypertension on: •Repeated office BP measurements; or •Out-of-office BP measurement with ABPM and/or HBPM if logistically and economically feasible.
Treatment thresholds **High-normal BP (130–139/85–89 mmHg):** Unless the necessary evidence is obtained it is not recommended to initiate antihypertensive drug therapy at high-normal BP.	**Treatment thresholds** **High-normal BP (130–139/85–89 mmHg):** Drug treatment may be considered when CV risk is very high due to established CVD, especially CAD.
Treatment thresholds **Treatment of low-risk grade 1 hypertension:** Initiation of antihypertensive drug treatment should also be considered in grade 1 hypertensive patients at low to moderate risk, when BP is within this range at several repeated visits or elevated by ambulatory BP criteria, and remains within this range despite a reasonable period of time with lifestyle measures.	**Treatment thresholds** **Treatment of low-risk grade 1 hypertension:** In patients with grade 1 hypertension at low–moderate risk and without evidence of HMOD, BP-lowering drug treatment is recommended if the patient remains hypertensive, after a period of lifestyle intervention.
Treatment thresholds **Older patients** Antihypertensive drug treatment may be considered in the elderly (at least when younger than 80 years) when SBP is in the 140–159 mmHg range, provided that antihypertensive treatment is well tolerated.	**Treatment thresholds** **Older patients** BP-lowering drug treatment and lifestyle intervention is recommended in fit older patients (> 65 years but not > 80 years) when SBP is in the grade 1 range (140–159 mmHg), provided that treatment is well tolerated.

Recommendation Grading							
	Grade I		Grade IIa		Grade IIb		Grade III

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What is new and what has changed in the 2018 ESC/ESH hypertension guidelines? - 2

Changes in recommendations	
2013	**2018**
BP treatment targets A SBP goal of < 140 mmHg is recommended.	**BP treatment targets** •It is recommended that the first objective of treatment should be to lower BP to <140/90 mmHg **in all patients** and provided that the treatment is well tolerated, treated BP values should be targeted to 130/80 mmHg or lower, in most patients. •In patients < 65 years it is recommended that SBP should be lowered to a BP range of 120 to < 130 mmHg in most patients.
BP treatment targets in older patients (65–80 years) A SBP target between of 140 and 150 mmHg is recommended for older patients (65–80 years).	**BP treatment targets in older patients (65–80 years)** In older patients (≥ 65 years), it is recommended that SBP should be targeted to a BP range of 130 to < 140 mmHg.
BP treatment targets in patients aged over 80 years A SBP target between 140 and 150 mmHg should be considered in people older than 80 years, with an initial SBP ≥ 160 mmHg, provided that they are in good physical and mental condition.	**BP treatment targets in patients aged over 80 years** A SBP target range of 130 to < 140 mmHg is recommended for people older than 80 years, if tolerated.
DBP targets A DBP target of < 90 mmHg is always recommended, except in patients with diabetes, in whom values < 85 mmHg are recommended.	**DBP targets** A DBP target of < 80 mmHg should be considered for all hypertensive patients, independent of the level of risk and comorbidities.

Recommendation Grading							
	Grade I		Grade IIa		Grade IIb		Grade III

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What is new and what has changed in the 2018 ESC/ESH hypertension guidelines? - 3

Changes in recommendations	
2013	**2018**
Initiation of drug treatment Initiation of antihypertensive therapy with a two-drug combination may be considered in patients with markedly high baseline BP or at high CV risk.	**Initiation of drug treatment** It is recommended to initiate an antihypertensive treatment with a two-drug combination, preferably in a SPC. The exceptions are frail older patients and those at low risk and with grade 1 hypertension (particularly if SBP is < 150 mmHg).
Resistant hypertension Mineralocorticoid receptor antagonists, amiloride, and the alpha-1 blocker doxazosin should be considered if no contraindication exists.	**Resistant hypertension** Recommended treatment of resistant hypertension is the addition of low-dose spironolactone to existing treatment, or the addition of further diuretic therapy if intolerant to spironolactone, with either eplerenone, amiloride, higher-dose thiazide/thiazide-like diuretic or a loop diuretic, or the addition of bisoprolol or doxazosin.
Device-based therapy for hypertension In case of ineffectiveness of drug treatment, invasive procedures such as renal denervation and baroreceptor stimulation may be considered.	**Device-based therapy for hypertension** Use of device-based therapies is not recommended for the routine treatment of hypertension, unless in the context of clinical studies and RCTs, until further evidence regarding their safety and efficacy becomes available.

Recommendation Grading							
	Grade I		Grade IIa		Grade IIb		Grade III

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New sections / recommendations

- When to suspect and how to screen for the causes of secondary hypertension
- Management of hypertension emergencies
- Updated recommendations on the management of BP in acute stroke
- Updated recommendations on the management of hypertension in women and pregnancy
- Hypertension in different ethnic groups
- The effects of altitude on BP
- Hypertension and chronic obstructive pulmonary disease
- Hypertension and AF and other arrhythmias
- Oral anticoagulant use in hypertension
- Hypertension and sexual dysfunction
- Hypertension and cancer therapies
- Perioperative management of hypertension
- Glucose-lowering drugs and BP
- Updated recommendations on CV risk assessment and management:
  (i) using the SCORE system to assess risk in patients without CVD;
  (ii) the importance of HMOD in modifying CV risk; and
  (iii) the use of statins and aspirin for CVD prevention.

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New concepts

- BP measurement
- Less conservative treatment of BP in older and very old patients
- A SPC treatment strategy to improve BP control
- New target ranges for BP in treated patients
- Detecting poor adherence to drug therapy
- A key role for nurses, pharmacists in the longer-term management of hypertension

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Classification of blood pressure

Recommendation	Class	Level
It is recommended that BP be classified as optimal, normal, high-normal, or grades 1–3 hypertension, according to office BP.	I	C

Classification of office BP and definitions of hypertension grade

Category	Systolic (mmHg)		Diastolic (mmHg)
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

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Factors influencing CV risk in patients with hypertension - 1

Demographic characteristics and laboratory parameters
Sex (men > women)
Age
Smoking – current or past history
Total cholesterol and HDL-C
Uric acid
Diabetes
Overweight or obesity
Family history of premature CVD (men aged < 55 years and women aged < 65 years)
Family or parental history of early onset hypertension
Early onset menopause
Sedentary lifestyle
Psychosocial and socioeconomic factors
Heart rate (resting values > 80 beats per min)

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Factors influencing CV risk in patients with hypertension - 2

Asymptomatic HMOD
Arterial stiffening: Pulse pressure (in older people) ≥ 60 mmHg Carotid–femoral PWV > 10 m/s
ECG LVH
Echocardiographic LVH
Microalbuminuria or elevated albumin–creatinine ratio
Moderate CKD with eGFR 30–59 mL/min/1.73 m^2 (BSA)
Ankle–brachial index < 0.9
Advanced retinopathy: haemorrhages or exudates, papilloedema

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Factors influencing CV risk in patients with hypertension - 3

Established CV or renal disease
Cerebrovascular disease: ischaemic stroke, cerebral haemorrhage, TIA
CAD: myocardial infarction, angina, myocardial revascularization
Presence of atheromatous plaque on imaging
Heart failure, including HFpEF
Peripheral artery disease
Atrial fibrillation
Severe CKD with eGFR < 30 mL/min/1.73 m^2

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10-year CV risk categories (SCORE system)

Very high risk	**People with any of the following:** **Documented CVD, either clinical or unequivocal on imaging.** • **Clinical CVD** includes acute myocardial infarction, acute coronary syndrome, coronary or other arterial revascularization, stroke, TIA, aortic aneurysm and PAD. • **Unequivocal documented CVD on imaging** includes significant plaque (i.e. ≥ 50% stenosis) on angiography or ultrasound. It does not include increase in carotid intima-media thickness. • **Diabetes mellitus with target organ damage**, e.g. proteinuria or a with a major risk factor such as grade 3 hypertension or hypercholesterolaemia • **Severe CKD** (eGFR < 30 mL/min/1.73 m^2) • **A calculated 10-year SCORE of ≥ 10%**
High risk	**People with any of the following:** • **Marked elevation of a single risk factor**, particularly cholesterol > 8 mmol/L (> 310 mg/dL) e.g. familial hypercholesterolaemia, grade 3 hypertension (BP ≥ 180/110 mmHg) • **Most other people with diabetes mellitus** (except some young people with type 1 diabetes mellitus and without major risk factors, that may be moderate risk) • **Hypertensive LVH** • **Moderate CKD (eGFR 30–59 mL/min/1.73 m^2)** • **A calculated 10-year SCORE of 5–10%**
Moderate risk	**People with:** • **A calculated 10-year SCORE of 1% to < 5%** • **Grade 2 hypertension** • **Many middle-aged people** belong to this category
Low risk	**People with:** • **A calculated 10-year SCORE of < 1%**

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Risk modifiers increasing CV risk estimated by the SCORE system

Social deprivation – the origin of many causes of CVD
Obesity (measured by BMI) and central obesity (measured by waist circumference)
Physical inactivity
Psychosocial stress, including vital exhaustion
Family history of premature CVD (occurring at age < 55 years in men and < 60 years in women)
Autoimmune and other inflammatory disorders
Major psychiatric disorders
Treatment for infection with human immunodeficiency virus
Atrial fibrillation
Left ventricular hypertrophy
CKD
Obstructive sleep apnoea syndrome

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Correction factors for the SCORE CV risk estimates in first-generation immigrants to Europe

Region of origin	Multiplication factor
Southern Asia	1.4
Sub-Saharan Africa	1.3
Caribbean	1.3
Western Asia	1.2
Northern Africa	0.9
Eastern Asia	0.7
South America	0.7

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Classification of hypertension stages according to BP levels, presence of CV risk factors, HMOD, or comorbidities

Hypertension disease staging	Other risk factors, HMOD, or disease	BP (mmHg) grading			
		High-normal SBP 130–139 DBP 85–89	Grade 1 SBP 140–159 DBP 90–99	Grade 2 SBP 160–179 DBP 100–109	Grade 3 SBP ≥ 180 DBP ≥ 110
Stage 1 (uncomplicated)	No other risk factors	Low risk	Low risk	Moderate risk	High risk
	1 or 2 risk factors	Low risk	Moderate risk	Moderate to high risk	High risk
	≥ 3 risk factors	Low to moderate risk	Moderate to high risk	High risk	High risk
Stage 2 (asymptomatic disease)	HMOD, CKD grade 3, or diabetes mellitus without organ damage	Moderate to high risk	High risk	High risk	High to very high risk
Stage 3 (established disease)	Established CVD, CKD grade ≥ 4, or diabetes mellitus with organ damage	Very high risk	Very high risk	Very high risk	Very high risk

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Hypertension and CV risk assessment

Recommendation	Class	Level
CV risk assessment with the SCORE system is recommended for hypertensive patients who are not already at high or very high risk due to established CVD, renal disease or diabetes, a markedly elevated single risk factor (e.g. cholesterol), or hypertensive LVH.	I	B

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Office BP measurement - 1

Patients should be seated comfortably in a quiet environment for 5 min before beginning BP measurements.
Three BP measurements should be recorded, 1–2 min apart, and additional measurements only if the first two readings differ by > 10 mmHg. BP is recorded as the average of the last two BP readings.
Additional measurements may have to be performed in patients with unstable BP values due to arrhythmias, such as in patients with AF, in whom manual auscultatory methods should be used as most automated devices have not been validated for BP measurement in patients with AF.
Use a standard bladder cuff (12–13 cm wide and 35 cm long) for most patients, but have larger and smaller cuffs available for larger (arm circumference > 32 cm) and thinner arms, respectively.
The cuff should be positioned at the level of the heart with the back and arm supported, to avoid muscle contraction and isometric-exercise dependent increases in BP.

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Office BP measurement - 2

When using auscultatory methods, use phase I and V (sudden reduction/disappearance) Korotkoff sounds to identify SBP and DBP, respectively.
Measure BP in both arms at the first visit to detect possible between-arm differences. Use the arm with the higher value as the reference.
Measure BP 1 minute and 3 min after standing from seated position in all patients at the first measurement to exclude orthostatic hypotension. Lying and standing BP measurements should also be considered in subsequent visits in older people, in people with diabetes, and in other conditions in which orthostatic hypotension may frequently occur.
Record heart rate and use pulse palpation to exclude arrhythmia.

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Definitions of hypertension according to office, ambulatory, and home BP levels

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

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Comparison of ABPM and HBPM

ABPM	HBPM
Advantages • Can identify white-coat and masked hypertension • Stronger prognostic evidence • Night-time readings • Measurement in real-life settings • Additional prognostic BP phenotypes • Abundant information from a single measurement session, including short-term BP variability	**Advantages** • Can identify white-coat and masked hypertension • Cheap and widely available • Measurement in a home setting, which may be more relaxed than the doctor's office • Patient engagement in BP measurement • Easily repeated and used over longer periods to assess day-to-day BP variability
Disadvantages • Expensive and sometimes limited availability • Can be uncomfortable	**Disadvantages** • Only static BP is available • Potential for measurement error • No nocturnal readings

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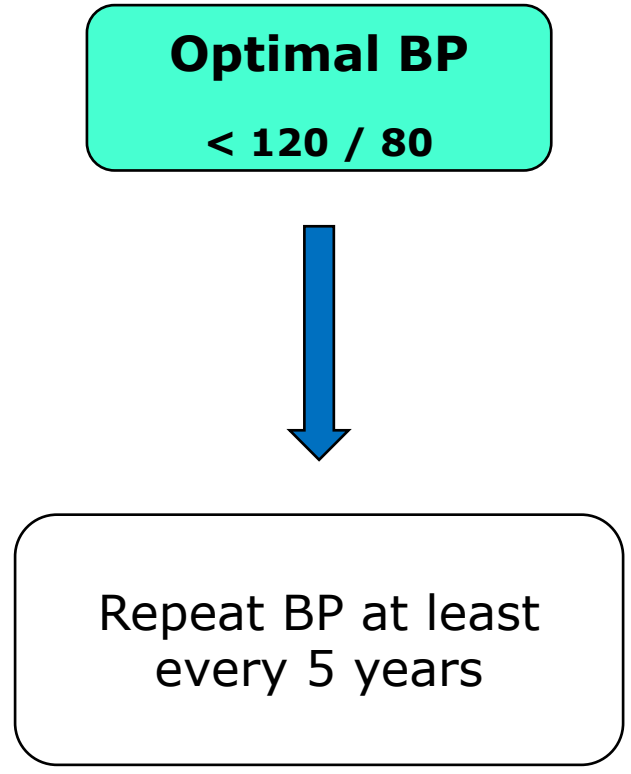
Screening and diagnosis of hypertension



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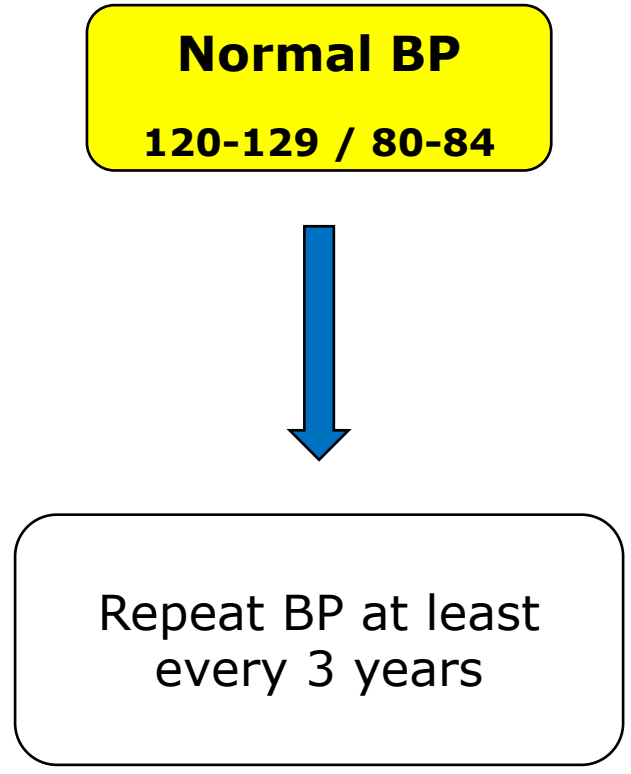
Screening and diagnosis of hypertension



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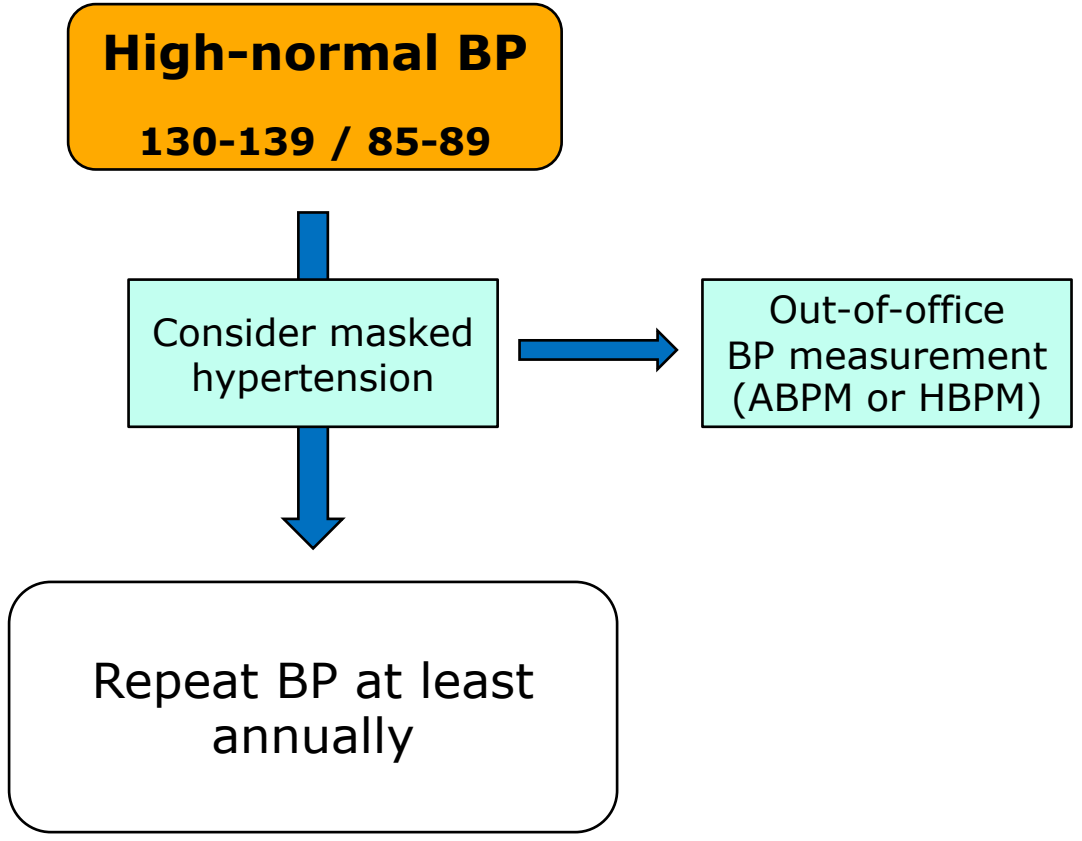
Screening and diagnosis of hypertension



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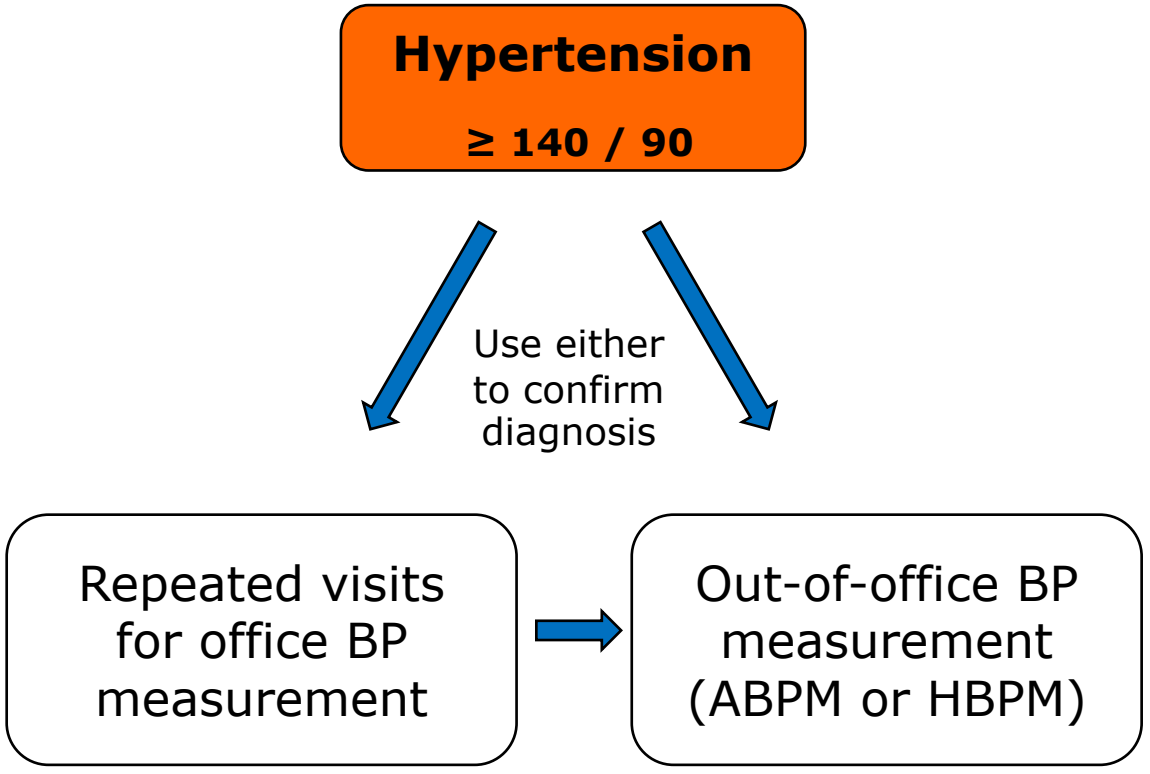
Screening and diagnosis of hypertension



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Clinical indications for HBPM or ABPM - 1

Conditions in which white-coat hypertension is more common, for example: • Grade I hypertension on office BP measurement • Marked office BP elevation without HMOD
Conditions in which masked hypertension is more common, for example: • High-normal office BP • Normal office BP in individuals with HMOD or at high total CV risk
Postural and post-prandial hypotension in untreated and treated patients
Evaluation of resistant hypertension

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Clinical indications for HBPM or ABPM - 2

Evaluation of BP control, especially in treated higher-risk patients
Exaggerated BP response to exercise
When there is considerable variability in the office BP
Evaluating symptoms consistent with hypotension during treatment
Specific indications for ABPM rather than HBPM: • Assessment of nocturnal BP values and dipping status (e.g. suspicion of nocturnal hypertension, such as in sleep apnoea, CKD, diabetes, endocrine hypertension, or autonomic dysfunction)

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BP measurement - 1

Recommendations	Class	Level
Screening programmes for hypertension are recommended. All adults (18 years or older) should have their office BP measured and recorded in their medical file and be aware of their BP.	I	B

BP measurement - 2

Recommendations	Class	Level
• Further BP recording is indicated, at least every 5 years if BP remains optimal.	I	C
• Further BP recording is indicated, at least every 3 years if BP remains normal.	I	C
• If BP remains high-normal, further BP recording, at least annually, is recommended.	I	C
• In older patients (> 50 years), more frequent screening of office BP should be considered for each BP category because of the steeper rise in SBP with ageing.	IIa	C

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BP measurement - 3

Recommendations	Class	Level
It is recommended that office BP should be measured in both arms at least at the first visit because a between-arm SBP difference of > 15 mmHg is suggestive of atheromatous disease and is associated with an increased CV risk.	I	A

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BP measurement - 4

Recommendations	Class	Level
If a between-arm difference in BP is recorded, then it is recommended that all subsequent BP readings use the arm with the higher BP reading.	I	C

BP measurement - 5

Recommendations	Class	Level
It is recommended that the diagnosis of hypertension should be based on:		
• Repeated office BP measurements on more than one visit, except when hypertension is severe (e.g. grade 3 and especially in high-risk patients). At each visit, three BP measurements should be recorded, 1–2 min apart, and additional measurements should be performed if the first two readings differ by > 10 mmHg. The patient's BP is the average of the last two BP readings.	I	C
Or • Out-of-office BP measurement with ABPM and/or HBPM, provided that these measurements are logistically and economically feasible.	I	C

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BP measurement - 6

Recommendations	Class	Level
Out-of-office BP (i.e. ABPM or HBPM) is specifically recommended for a number of clinical indications, such as identifying white-coat and masked hypertension, quantifying the effects of treatment, and identifying possible causes of side-effects (e.g. symptomatic hypotension).	I	A

BP measurement - 7

Recommendations	Class	Level
It is recommended that all hypertensive patients undergo pulse palpation at rest to determine heart rate and search for arrhythmias such as AF.	I	C

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BP measurement - 8

Recommendations	Class	Level
Other BP measures and indices (pulse pressure, BP variability, exercise BP, central BP) may be considered but are not often used for routine clinical use at present. They may provide useful additional information in some circumstances and are valuable tools for research.	IIb	C

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Key information to be collected in personal and family medical history - 1

Risk factors
Family and personal history of hypertension, CVD, stroke, or renal disease
Family and personal history of associated risk factors (e.g. familial hypercholesterolaemia)
Smoking history
Dietary history and salt intake
Alcohol consumption
Lack of physical exercise/sedentary lifestyle
History of erectile dysfunction
Sleep history, snoring, sleep apnoea (information also from partner)
Previous hypertension in pregnancy/pre-eclampsia

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Key information to be collected in personal and family medical history - 2

History and symptoms of HMOD, CVD, stroke, and renal disease
Brain and eyes: headache, vertigo, syncope, impaired vision, TIA, sensory or motor deficit, stroke, carotid revascularization, cognitive impairment, or dementia (in the elderly)
Heart: chest pain, shortness of breath, oedema, myocardial infarction, coronary revascularization, syncope, history of palpitations, arrhythmias (especially AF), heart failure
Kidney: thirst, polyuria, nocturia, haematuria, urinary tract infections
Peripheral arteries: cold extremities, intermittent claudication, pain-free walking distance, pain at rest, peripheral revascularization
Patient or family history of CKD (e.g. polycystic kidney disease)

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Key information to be collected in personal and family medical history - 3

History 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 renal/urinary tract disease
Recreational drug/substance abuse/concurrent therapies: corticosteroids, nasal vasoconstrictor, chemotherapy, yohimbine, liquorice
Repetitive episodes of sweating, headache, anxiety, palpitations, suggestive of pheochromocytoma
History of spontaneous or diuretic-provoked hypokalaemia, episodes of muscle weakness, and tetany (hyperaldosteronism)
Symptoms suggestive of thyroid disease or hyperparathyroidism
History of or current pregnancy and oral contraceptive use
History of sleep apnoea

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Key information to be collected in personal and family medical history - 4

Antihypertensive drug treatment
Current/past antihypertensive medication including effectiveness and intolerance to previous medications
Adherence to therapy

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Key steps in physical examination - 1

Body habitus
Weight and height measured on a calibrated scale, with calculation of BMI
Waist circumference

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Key steps in physical examination - 2

Signs of HMOD
Neurological examination and cognitive status
Fundoscopic examination for hypertensive retinopathy
Palpation and auscultation of heart and carotid arteries
Palpation of peripheral arteries
Comparison of BP in both arms (at least once)

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Key steps in physical examination - 3

Secondary hypertension
Skin inspection – cafe-au-lait patches of neurofibromatosis (phaeochromocytoma)
Kidney palpation for signs of renal enlargement in polycystic kidney disease
Auscultation of heart and renal arteries for murmurs or bruits indicative of aortic coarctation or renovascular hypertension
Comparison of radial with femoral pulse – to detect radio-femoral delay in aortic coarctation
Signs of Cushing's disease or acromegaly
Signs of thyroid disease

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Routine work-up for evaluation of hypertensive patients

Routine laboratory tests
Haemoglobin and/or haematocrit
Fasting blood glucose and glycated HbA_{1c}
Blood lipids: total cholesterol, LDL cholesterol, HDL cholesterol
Blood triglycerides
Blood potassium and sodium
Blood uric acid
Blood creatinine and eGFR
Blood liver function tests
Urine analysis: microscopic examination; urinary protein by dipstick test or, ideally, albumin:creatinine ratio
12-lead ECG

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Assessment of HMOD - 1

Basic screening tests for HMOD	Indication and interpretation
12-lead ECG	Screen for LVH and other possible cardiac abnormalities and to document heart rate and cardiac rhythm
Urine albumin:creatinine ratio	To detect elevations in albumin excretion indicative of possible renal disease
Blood creatinine and eGFR	To detect possible renal disease
Fundoscopy	To detect hypertensive retinopathy, especially in patients with grade 2 or 3 hypertension

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Assessment of HMOD - 2

More detailed screening for HMOD	Indication and interpretation
Echocardiography	To evaluate cardiac structure and function, when this information will influence treatment decisions
Carotid ultrasound	To determine the presence of carotid plaque or stenosis, particularly in patients with cerebrovascular disease or vascular disease elsewhere
Abdominal ultrasound and Doppler studies	To evaluate renal size and structure (e.g. scarring) and exclude renal tract obstruction as possible underlying causes of CKD and hypertension Evaluate abdominal aorta for evidence of aneurysmal dilatation and vascular disease. Examine adrenal glands for evidence of adenoma or phaeochromocytoma (CT or MRI preferred for detailed examination) Renal artery Doppler studies to screen for the presence of renovascular disease, especially in the presence of asymmetric renal size
PWV	An index of aortic stiffness and underlying arteriosclerosis
ABI	Screen for evidence of PAD
Cognitive function testing	To evaluate cognition in patients with symptoms suggestive of cognitive impairment
Brain imaging	To evaluate the presence of ischaemic or haemorrhagic brain injury, especially in patients with a history of cerebrovascular disease or cognitive decline

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The most commonly used simple criteria and recognised cut-off points for definitions of ECG LVH

ECG voltage criteria	Criteria for LVH
$S_{V1}+R_{V5}$ (Sokolow-Lyon criterion)	> 35 mm
R wave in aVL	≥ 11 mm
$S_{V3}+R_{aVL}$ (Cornell voltage)	> 28 mm (men) > 20 mm (women)
Cornell duration product	> 2440 mm*ms

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Echocardiographic definitions of LVH, concentric geometry, LV chamber size, and left atrial dilatation

Parameter	Measure	Abnormality threshold
LVH	LV mass/height$^{2.7}$ (g/m$^{2.7}$)	> 50 (men) > 47 (women)
LVH	LV mass/BSA (g/m^2)	> 115 (men) > 95 (women)
LV concentric geometry	RWT	≥ 0.43
LV chamber size	LV end-diastolic diameter/height (cm/m)	> 3.4 (men) > 3.3 (women)
Left atrial size (elliptical)	Left atrial volume/height^2 (mL/m^2)	> 18.5 (men) > 16.5 (women)

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Sensitivity to detect treatment-induced changes, reproducibility and operator independence, time to changes, and prognostic value of changes provided by markers of HMOD

Marker of HMOD	Sensitivity to changes	Reproducibility and operator independence	Time to changes	Prognostic value of the change
LVH by ECG	Low	High	Moderate (> 6 months)	Yes
LVH by echocardiogram	Moderate	Moderate	Moderate (> 6 months)	Yes
LVH by CMR	High	High	Moderate (> 6 months)	No data
eGFR	Moderate	High	Very slow (years)	Yes
Urinary albumin excretion	High	Moderate	Fast (weeks to months)	Moderate
Carotid IMT	Very low	Low	Slow (> 12 months)	No
PWV	High	Low	Fast (weeks to months)	Limited data
Ankle–brachial index	Low	Moderate	Slow (> 12 months)	Moderate

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Clinical evaluation and HMOD assessment - 1

Recommendations	Class	Level
Heart		
A 12-lead ECG is recommended for all hypertensive patients.	I	B
Echocardiography:		
• Is recommended in hypertensive patients when there are ECG abnormalities or signs or symptoms of LV dysfunction.	I	B
• May be considered when the detection of LVH may influence treatment decisions.	IIb	B
Blood vessels		
Ultrasound examination of the carotid arteries:		
• Is recommended in patients with stroke or TIA.	I	B
• May be considered for the detection of asymptomatic atherosclerotic plaques or carotid stenosis, in patients with documented vascular disease elsewhere.	IIb	B
Measurement of PWV may be considered for measuring arterial stiffness.	IIb	B
Measurement of ABI may be considered for the detection of advanced LEAD.	IIb	B

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Clinical evaluation and HMOD assessment - 2

Recommendations	Class	Level
Kidney		
Measurement of serum creatinine and eGFR is recommended in all hypertensive patients.	I	B
Measurement of urine albumin:creatinine ratio is recommended in all hypertensive patients.	I	B
Renal ultrasound and Doppler examination should be considered in patients with impaired renal function, albuminuria, or for suspected secondary hypertension.	IIa	C
Fundoscopy		
Is recommended in patients with grades 2 or 3 hypertension and all hypertensive patients with diabetes.	I	C
May be considered in other hypertensive patients.	IIb	C
Brain		
In hypertensive patients with neurological symptoms and/or cognitive decline, brain MRI or CT should be considered for detecting brain infarctions, microbleeds, and WMLs.	IIa	B

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Genetic testing and hypertension

Recommendations	Class	Level
Genetic testing should be considered in specialist centres for patients suspected to have rare monogenic causes of secondary hypertension or for those with phaeochromocytoma.	IIa	B
Routine genetic testing for hypertensive patients is not recommended.	III	C

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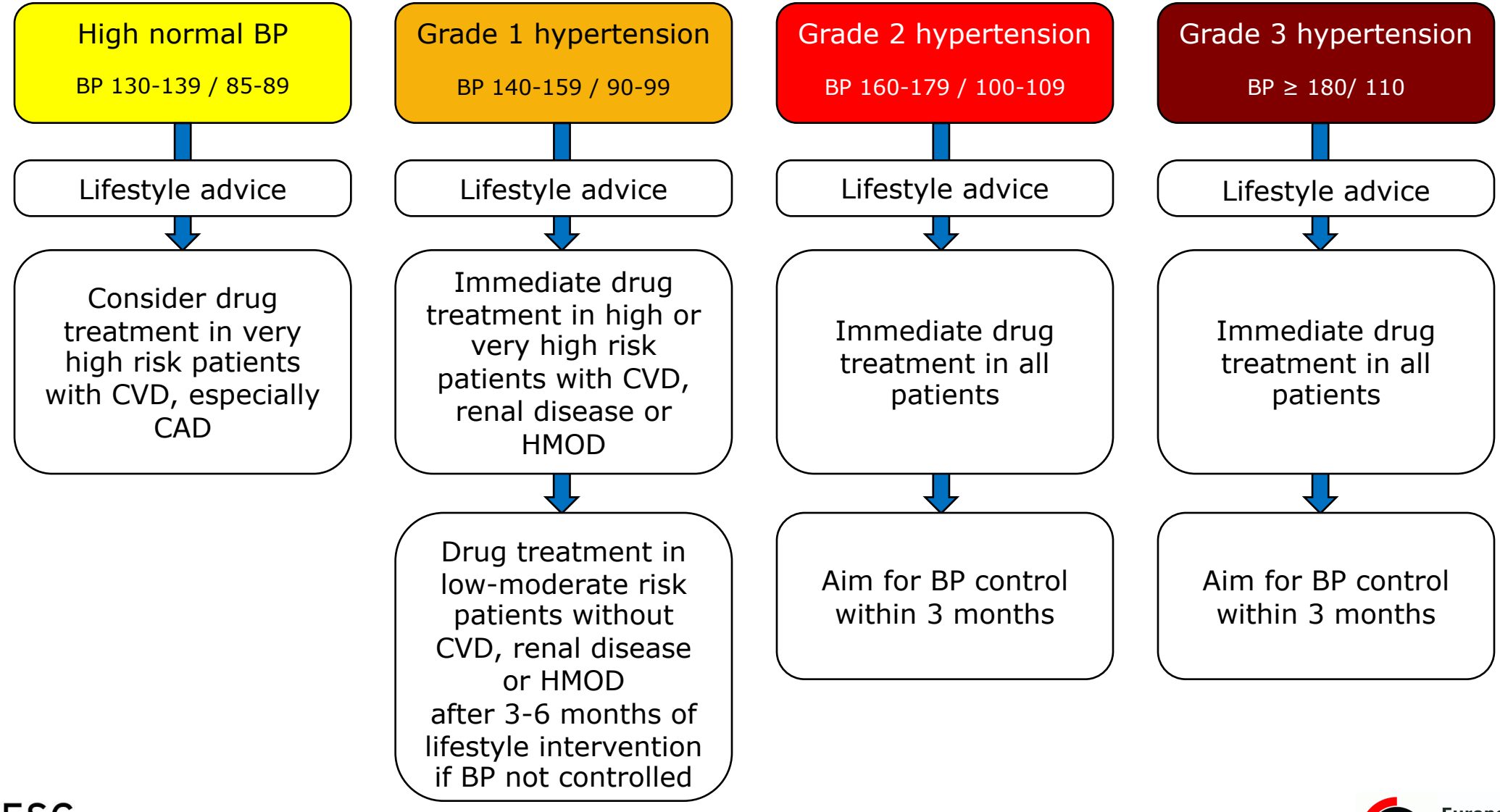
Initiation of BP-lowering treatment (lifestyle changes and medication) at different initial office BP levels



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Initiation of hypertension treatment according to office BP - 1

Recommendations	Class	Level
Prompt initiation of BP-lowering drug treatment is recommended in patients with grade 2 or 3 hypertension at any level of CV risk, simultaneous with the initiation of lifestyle changes.	I	A

Initiation of hypertension treatment according to office BP - 2

Recommendations	Class	Level
In patients with grade 1 hypertension:		
• Lifestyle interventions are recommended to determine if this will normalize BP.	II	B
• In patients with grade 1 hypertension at low-moderate risk and without evidence of HMOD, BP-lowering drug treatment is recommended if the patient remains hypertensive after a period of lifestyle intervention.	I	A
• In patients with grade 1 hypertension and at high-risk or with evidence of HMOD, prompt initiation of drug treatment is recommended simultaneously with lifestyle interventions.	I	A

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Initiation of hypertension treatment according to office BP - 3

Recommendations	Class	Level
In fit older patients with hypertension (even if age > 80 years), BP-lowering drug treatment and lifestyle intervention are recommended when SBP is ≥ 160 mmHg.	I	A
BP-lowering drug treatment and lifestyle intervention are recommended in the fit older patients (> 65 years but not over 80 years) when SBP is in the grade 1 range (140–159 mmHg), provided that treatment is well tolerated.	I	A
Antihypertensive treatment may also be considered in frail older patients if tolerated.	IIb	B
Withdrawal of BP-lowering drug treatment on the basis of age, even when patients attain an age of ≥ 80 years, is not recommended, provided that treatment is well tolerated.	III	A

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Initiation of hypertension treatment according to office BP - 4

Recommendations	Class	Level
In patients with high-normal BP (130–139/85–89 mmHg):		
• Lifestyle changes are recommended.	I	A
• Drug treatment may be considered when their CV is very high due to established CVD, especially CAD.	IIb	A

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Summary of office BP thresholds for treatment

Age group	Office SBP treatment threshold (mmHg)					Office DBP treatment threshold (mmHg)
	Hypertension	+ Diabetes	+ CKD	+ CAD	+ Stroke/TIA	
18–65 years	≥ 140	≥ 140	≥ 140	≥ 140	≥ 140	≥ 90
65–79 years	≥ 140	≥ 140	≥ 140	≥ 140	≥ 140	≥ 90
≥ 80 years	≥ 160	≥ 160	≥ 160	≥ 160	≥ 160	≥ 90
Office DBP treatment threshold (mmHg)	≥ 90	≥ 90	≥ 90	≥ 90	≥ 90	

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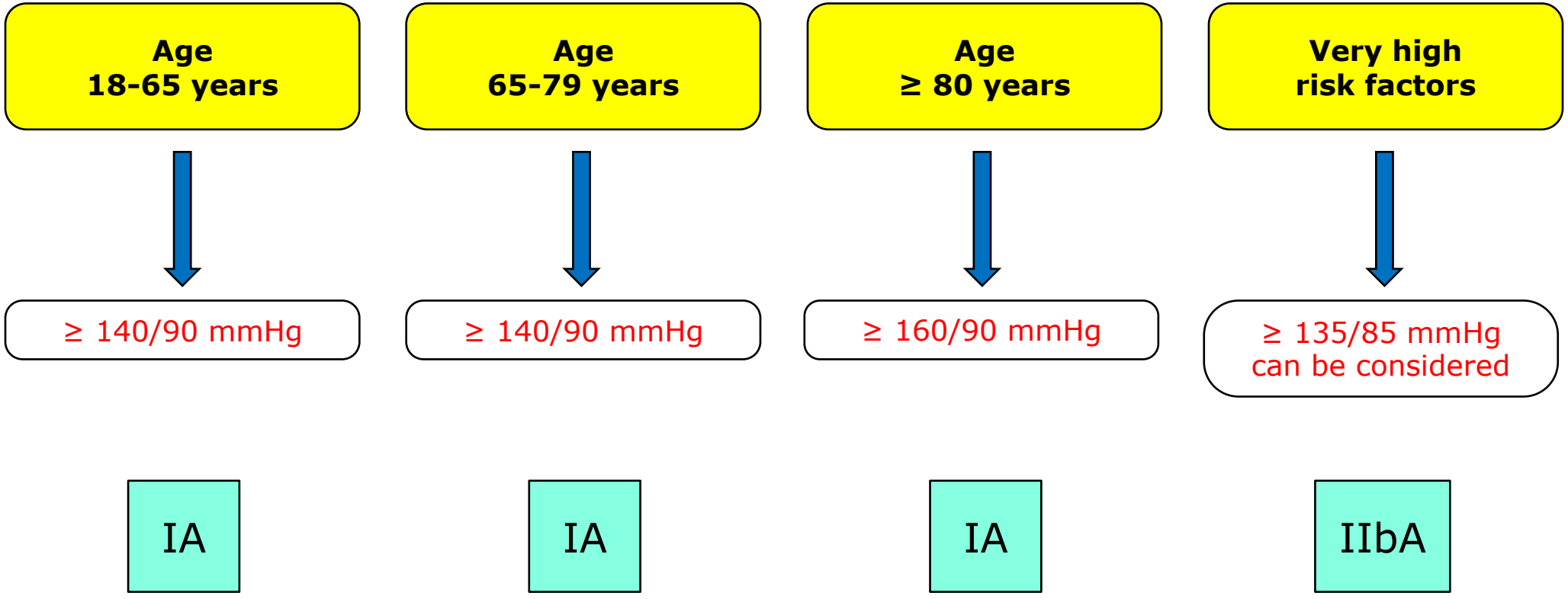
Summary of office BP thresholds for treatment



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Office BP treatment targets in hypertensive patients - 1

Recommendations	Class	Level
It is recommended that the first objective of treatment should be to lower BP to < 140/90 mmHg in all patients, and provided that the treatment is well tolerated, treated BP values should be targeted to 130/80 mmHg or lower, in most patients.	I	A

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Office BP treatment targets in hypertensive patients - 2

Recommendations	Class	Level
In patients < 65 years receiving BP-lowering drugs, it is recommended that SBP should be lowered to a BP range of 120-129 mmHg in most patients.	I	A

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Office BP treatment targets in hypertensive patients - 3

Recommendations	Class	Level
In older patients (aged ≥ 65 years) receiving BP-lowering drugs:		
• It is recommended that SBP should be targeted to a BP range of 130-139 mmHg.	I	A
• Close monitoring of adverse effects is recommended.	I	C
• These BP targets are recommended for patients at any level of CV risk and in patients with and without established CVD.	I	A

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Office BP treatment targets in hypertensive patients - 4

Recommendations	Class	Level
A DBP target of < 80 mmHg should be considered for all hypertensive patients, independent of the level of risk and comorbidities.	IIa	B

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Adoption of lifestyle changes in patients with hypertension

Recommendations	Class	Level
Salt restriction to < 5 g per day is recommended.	I	A
It is recommended to restrict alcohol consumption to: • Less than 14 units per week for men. • Less than 8 units per week for women.	I	A
It is recommended to avoid binge drinking.	III	C
Increased consumption of vegetables, fresh fruits, fish, nuts, unsaturated fatty acids (olive oil), low consumption of red meat, and consumption of low-fat dairy products are recommended.	I	A
Body-weight control is indicated to avoid obesity (BMI > 30 kg/m^2 or WC > 102 cm in men and > 88 cm in women) and aim at a healthy BMI (about 20–25 kg/m^2) and WC values (< 94 cm in men and < 80 cm in women) to reduce BP and CV risk.	I	A
Regular aerobic exercise (e.g. at least 30 min of moderate dynamic exercise on 5–7 days per week) is recommended.	I	A
Smoking cessation and supportive care and referral to smoking cessation programs are recommended.	I	B

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Compelling and possible contraindications to the use of specific antihypertensive drugs

Drug	Contraindications	
	Compelling	**Possible**
Diuretics (thiazides/thiazide-type, e.g. chlorthalidone and indapamide)	• Gout	• Metabolic syndrome • Glucose intolerance • Pregnancy • Hypercalcemia • Hypokalemia
Beta-blockers	• Asthma • Any high-grade sino-atrial or atrioventricular block • Bradycardia (heart rate < 60 beats per min)	• Metabolic syndrome • Glucose intolerance • Athletes and physically active patients
Calcium antagonists (dihydropyridines)		• Tachyarrhythmia • Heart failure (HFrEF, class III or IV) • Pre-existing severe leg oedema
Calcium antagonists (verapamil, diltiazem)	• Any high-grade sino-atrial or AV block • Severe LV dysfunction (LV EF < 40%) • Bradycardia (heart rate < 60 beats per min)	• Constipation
ACE inhibitors	• Pregnancy • Previous angioneurotic oedema • Hyperkalemia (potassium > 5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception
ARBs	• Pregnancy • Hyperkalemia (potassium > 5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception

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Major drug combinations used in trials of antihypertensive treatment in a stepped approach or as a randomized combination.

Combinations vs. placebo or monotherapy

Trial	Comparator	Type of patients	SBP diff (mmHg)	Outcomes (change in relative risk)
ACE inhibitor and diuretic combination				
PROGRESS	Placebo	Previous stroke or TIA	–9	–28% strokes ($P < 0.001$)
ADVANCE	Placebo	Diabetes	–5.6	–9% micro/macrovasc. events ($P = 0.04$)
HYVET	Placebo	Hypertensive; ≥ 80 years	–15	–34% CV events ($P < 0.001$)
ARB and diuretic combination				
SCOPE	Diuretic + placebo	Hypertensive; ≥ 70 years	–3.2	–28% non-fatal strokes ($P = 0.04$)
Calcium channel blocker and diuretic combination				
FEVER	Diuretic + placebo	Hypertensive	–4	–27% CV events ($P < 0.001$)
ACE inhibitor and CCB combination				
Syst-Eur	Placebo	Older with ISH	–10	–31% CV events ($P < 0.001$)
Syst-China	Placebo	Older with ISH	–9	–37% CV events ($P < 0.004$)
Beta-blocker and diuretic combination				
Coope and Warrender	Placebo	Older hypertensive	–18	–42% strokes ($P < 0.03$)
SHEP	Placebo	Older with ISH	–13	–36% strokes ($P < 0.001$)
STOP-Hypertension	Placebo	Older hypertensive	–23	–40% CV events ($P = 0.003$)
STOP-Hypertension 2	ACEI or conv. antiHT	Hypertensive	0	NS difference in CV events
Combination of two RAS blockers/ACE inhibitor + ARB or RAS blocker + renin inhibitor)				
ONTARGET	ACE inhibitor or ARB	High-risk patients		More renal events
ALTITUDE	ACE inhibitor or ARB	High-risk diabetic patients		More renal events

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Major drug combinations used in trials of antihypertensive treatment in a stepped approach or as a randomized combination.

Combinations vs. other combinations - 1

Trial	Comparator	Type of patients	SBP diff (mmHg)	Outcomes (change in relative risk)
ACE inhibitor and diuretic combination				
CAPPP	BB + diuretic	Hypertensive	+3	+5% CV events (NS)
ACCOMPLISH	ACE inhibitor + CCB	Hypertensive with risk factors	+1	+21% CV events ($P < 0.001$)
ARB and diuretic combination				
LIFE	BB + diuretic	Hypertensive with LVH	–1	–26% stroke ($P < 0.001$)
Calcium channel blocker and diuretic combination				
ELSA	BB + diuretic	Hypertensive	0	NS difference in CV events
CONVINCE	BB + diuretic	Hypertensive with risk factors	0	NS difference in CV events
VALUE	ARB + diuretic	High-risk hypertensive	–2.2	–3% CV events (P = NS)
COPE	CCB + BB	Hypertensive	+0.7	NS difference in CV events or stroke
ACE inhibitor and CCB combination				
NORDIL	BB + diuretic	Hypertensive	+3	NS difference in CV events
INVEST	BB + diuretic	Hypertensive with CAD	0	NS difference in CV events
ASCOT	BB + diuretic	Hypertensive with risk factors	–3	–16% CV events ($P < 0.001$)
ACCOMPLISH	ACE inhibitor + diuretic	Hypertensive with risk factors	–1	–21% CV events ($P < 0.001$)

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Major drug combinations used in trials of antihypertensive treatment in a stepped approach or as a randomized combination.

Combinations vs. other combinations - 2

Trial	Comparator	Type of patients	SBP diff (mmHg)	Outcomes (change in relative risk)
Beta-blocker and diuretic combination				
CAPPP	ACE inhibitor + diuretic	Hypertensive	–3	–5% CV events (*P* = NS)
LIFE	ARB + diuretic	Hypertensive with LVH	+1	+26% stroke (*P* < 0.001)
ALLHAT	ACE inhibitor + BB	Hypertensive with risk factors	–2	NS difference in CV events
ALLHAT	CCB + BB	Hypertensive with risk factors	–1	NS difference in CV events
CONVINCE	CCB + diuretic	Hypertensive with risk factors	0	NS difference in CV events
NORDIL	ACE inhibitor + CCB	Hypertensive	–3	NS difference in CV events
INVEST	ACE inhibitor + CCB	Hypertensive with CAD	0	NS difference in CV events
ASCOT	ACE inhibitor + CCB	Hypertensive with risk factors	+3	+16% CV events (*P* < 0.001)
Beta-blocker and CCB combination				
COPE	ARB+CCB	Hypertensive	+0.8	NS difference in CV events or stroke
ARB and CCB combination				
COPE	CCB + diuretic	Hypertensive	–0.7	NS difference in CV events or stroke
COPE	CCB + BB	Hypertensive	–0.8	NS difference in CV events or stroke
COLM	ARB + diuretic	Older hypertensive	0	NS difference in CV events

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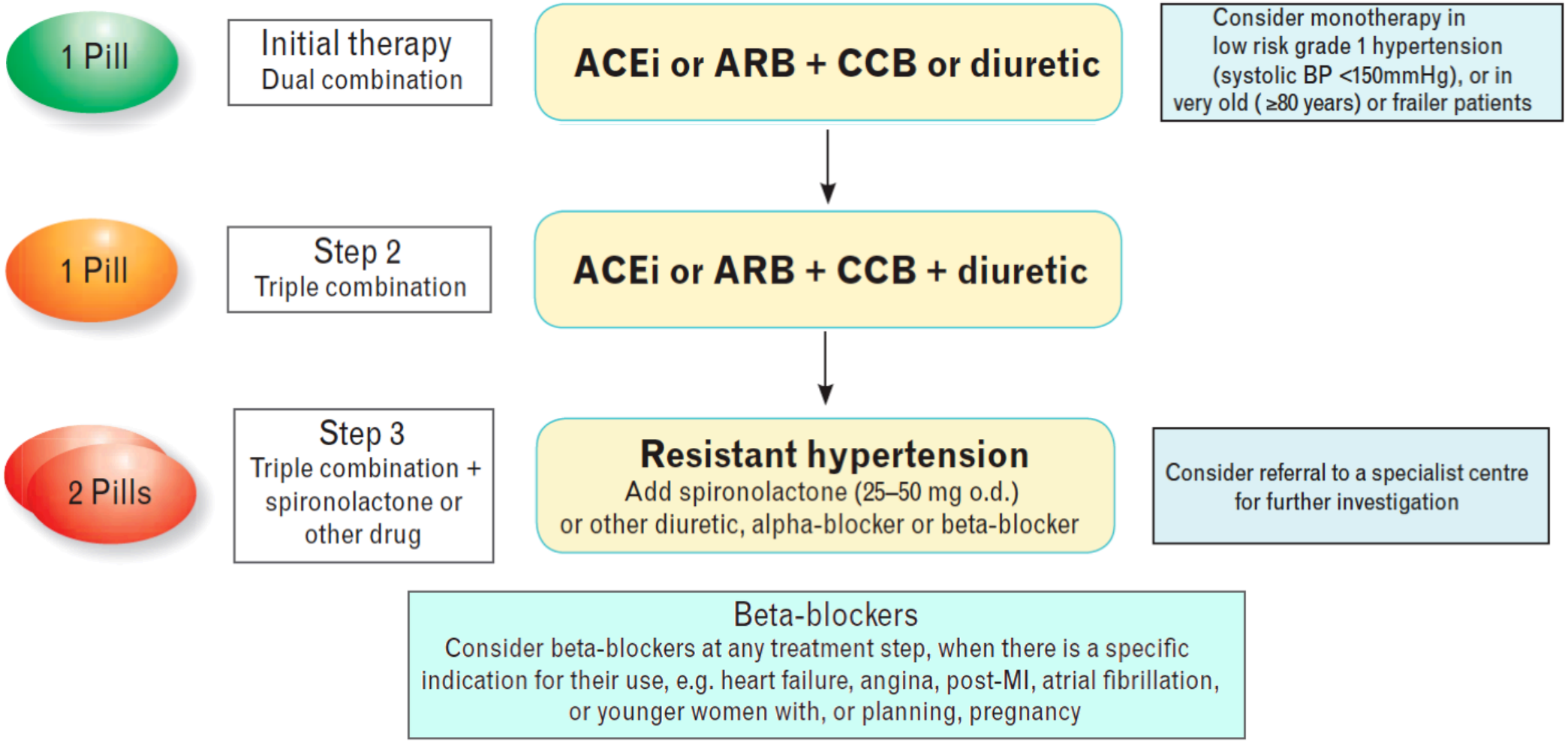
Core drug-treatment strategy for uncomplicated hypertension



The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD

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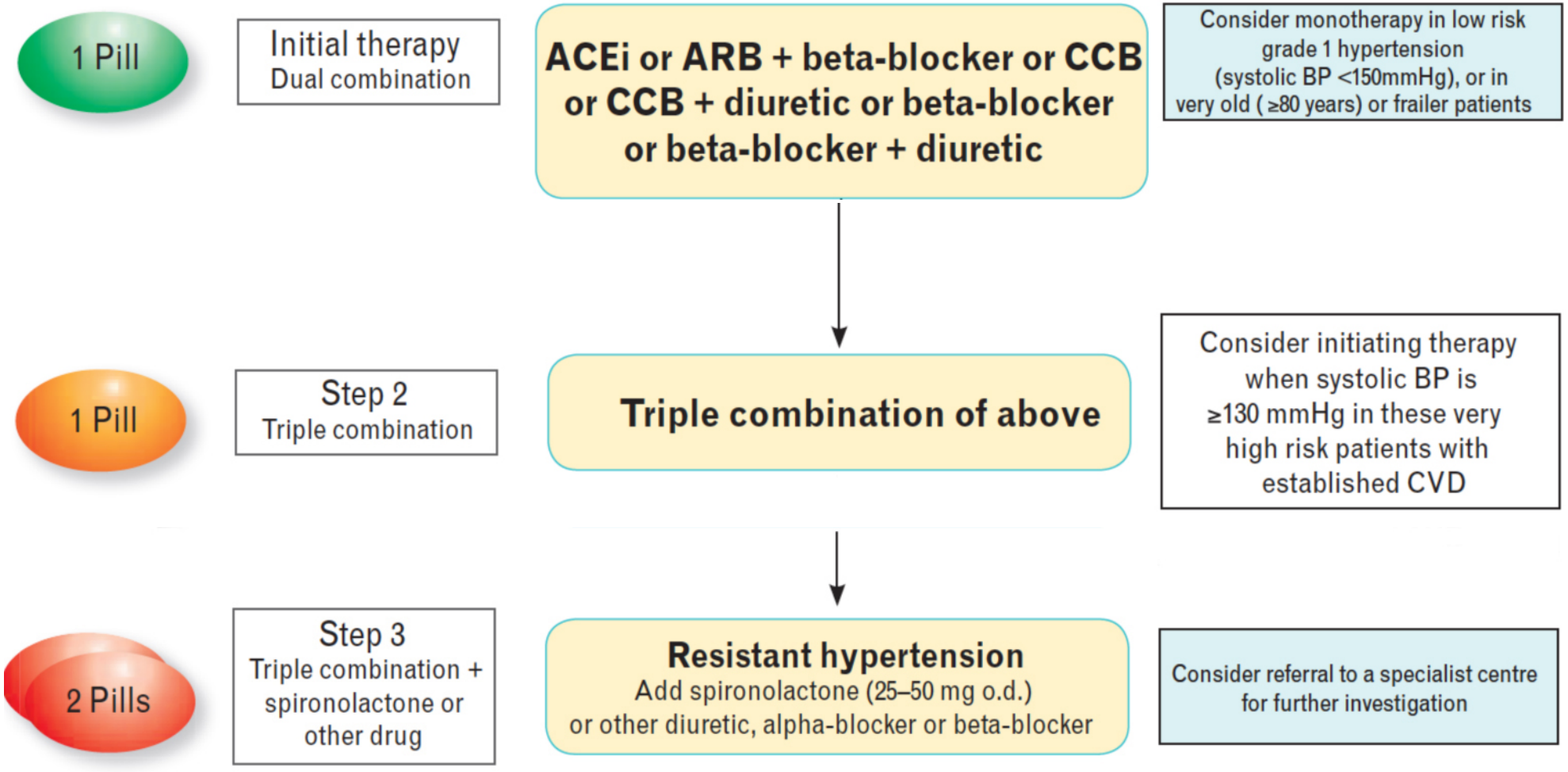
Drug-treatment strategy for hypertension and CAD



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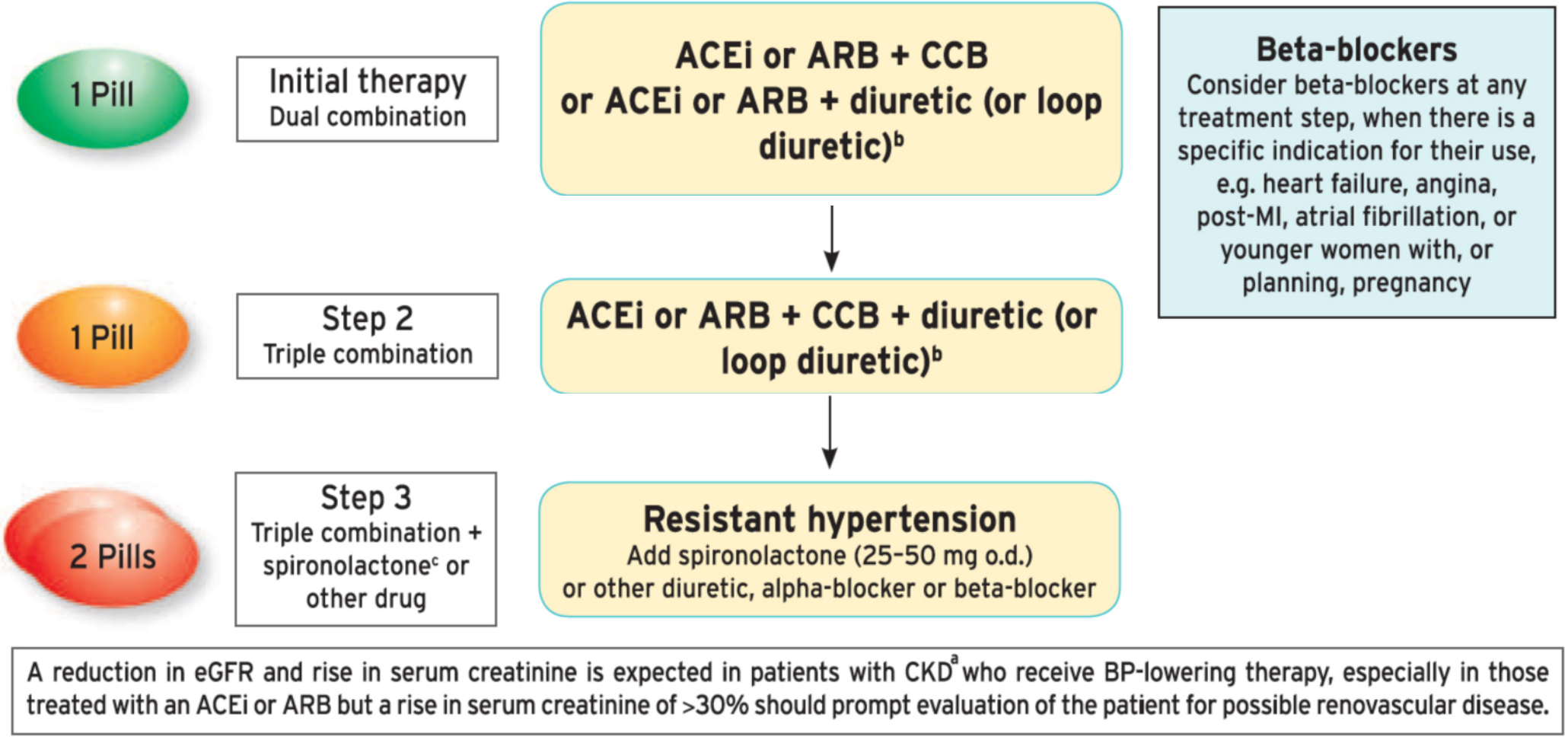
Drug-treatment strategy for hypertension and CKD



A reduction in eGFR and rise in serum creatinine is expected in patients with CKD[a] who receive BP-lowering therapy, especially in those treated with an ACEi or ARB but a rise in serum creatinine of >30% should prompt evaluation of the patient for possible renovascular disease.

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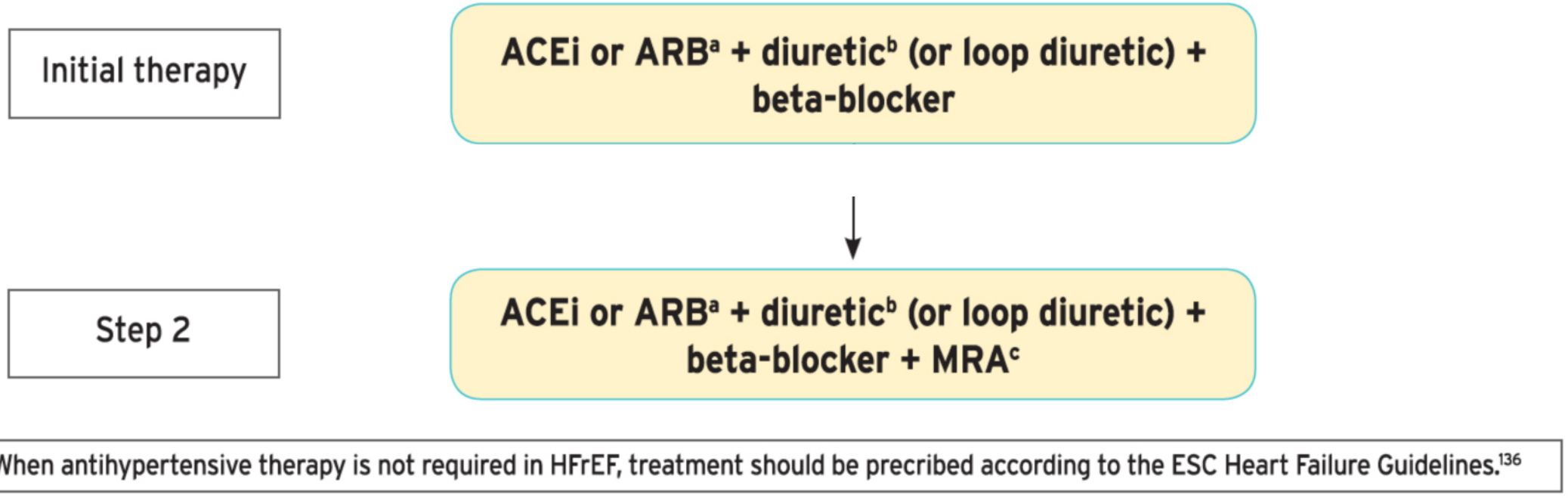
Drug-treatment strategy for hypertension and HRrEF



When antihypertensive therapy is not required in HFrEF, treatment should be precribed according to the ESC Heart Failure Guidelines.[136]

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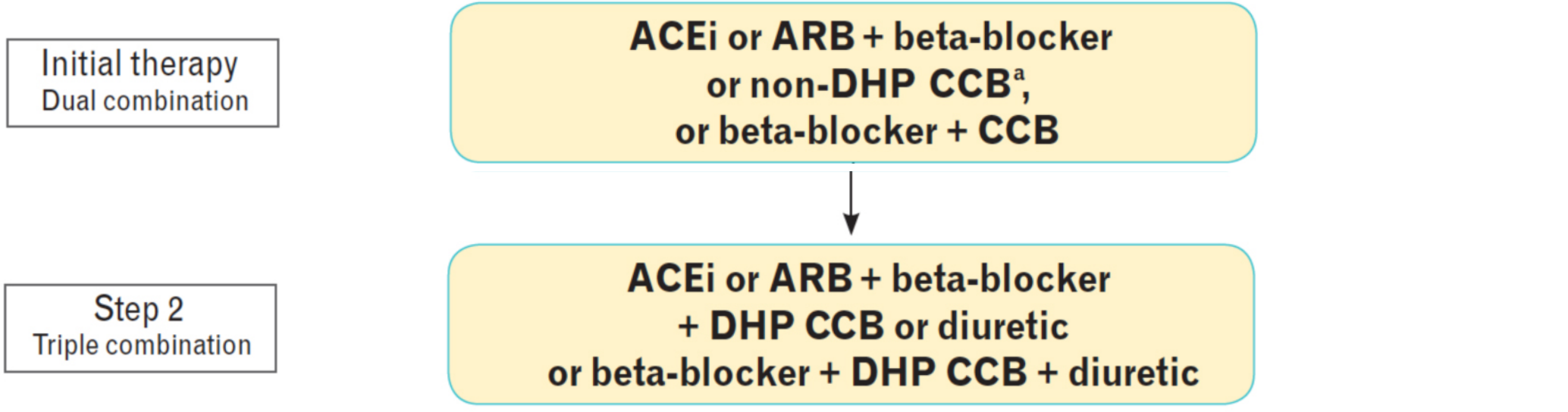
Drug-treatment strategy for hypertension and AF



Add oral anticoagulation when indicated according to the CHA_2DS_2-VASc score, unless contraindicated.

[a]Routine combination of beta-blockers with non-dihydropyridine CCBs (e.g. verapamil or diltiazem) is not recommended due to a potential marked reduction in heart rate.

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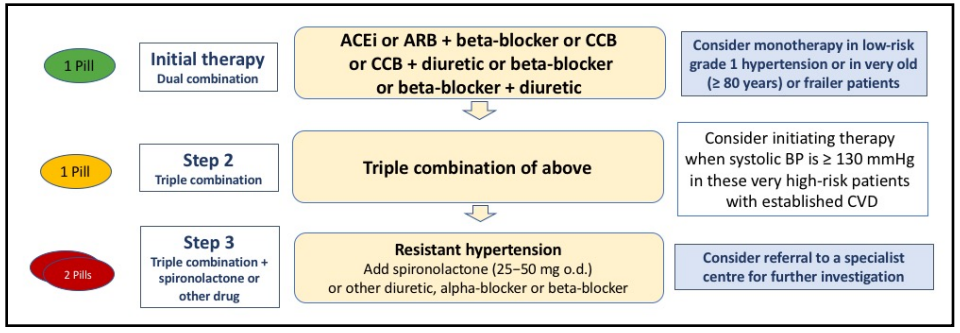
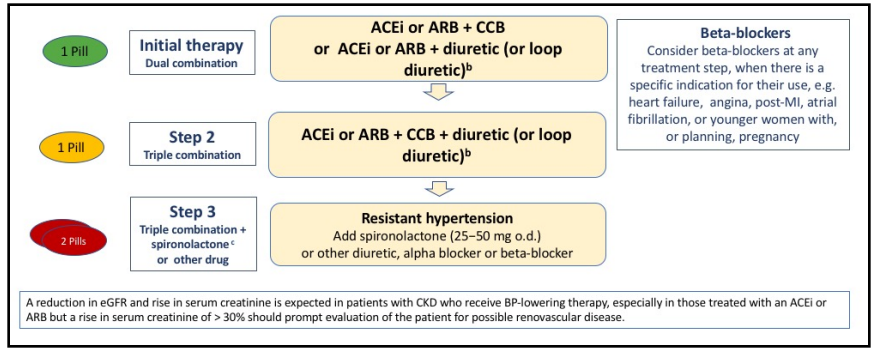
Drug-treatment strategies

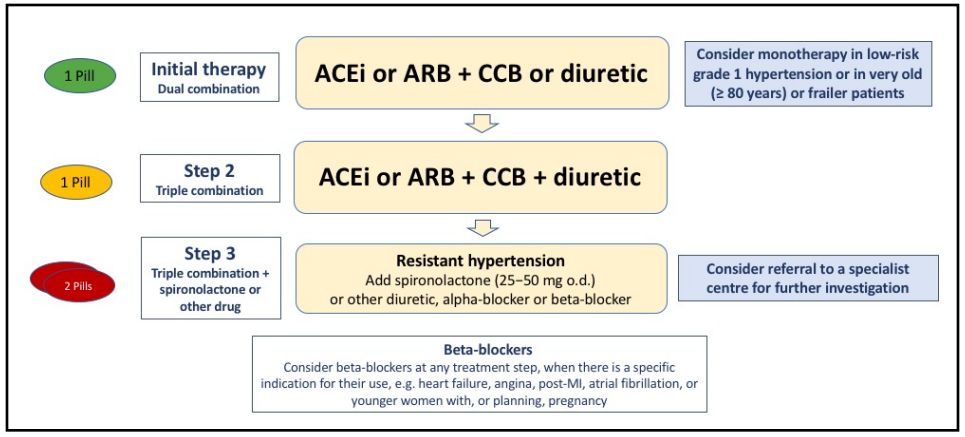
Hypertension and CAD



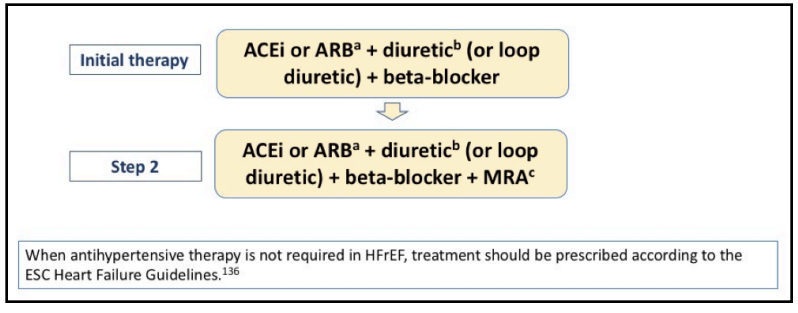
Hypertension and CKD



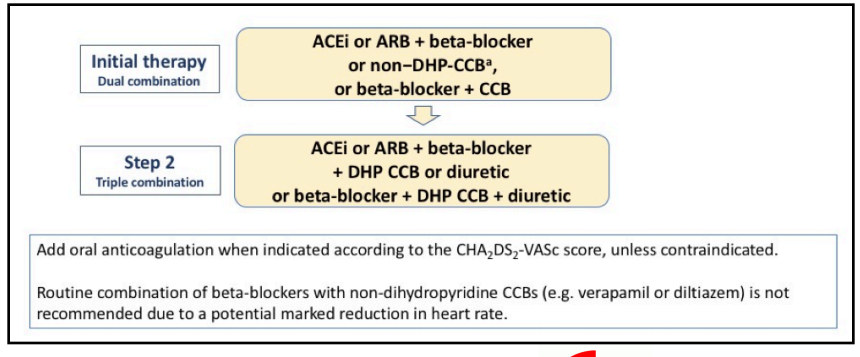
Core drug-treatment strategy for uncomplicated hypertension



Hypertension and HRrEF



Hypertension and AF



Office BP treatment target range

Age group	Office SBP treatment target ranges (mmHg)					Office DBP treatment target range (mmHg)
	Hypertension	+ Diabetes	+ CKD	+ CAD	+ Stroke/TIA	
18–65 years	**Target to 130** *or lower if tolerated* Not < 120	**Target to 130** *or lower if tolerated* Not < 120	**Target to < 140 to 130** *if tolerated*	**Target to 130** *or lower if tolerated* Not < 120	**Target to 130** *or lower if tolerated* Not < 120	70-79
65–79 years	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	70-79
≥ 80 years	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	**Target to < 140 to 130** *if tolerated*	70-79
Office DBP treatment target range(mmHg)	70-79	70-79	70-79	70-79	70-79	

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Office BP treatment target range

Age 18-65 years

- First SBP <140 mmHg
- Aim for SBP 130 mmHg or lower if tolerated
- DBP <80-70 mmHg
- Do not go <120/70 mmHg

IA

Age >65-79 years*

- First SBP <140 mmHg
- Aim for SBP 130 mmHg
- DBP <80-70 mmHg
- Do not go <130/70 mmHg

IA

Age ≥ 80 years*

- First SBP <140 mmHg
- Aim for SBP 130 mmHg
- DBP <80-70 mmHg
- Do not go <130/70 mmHg

IA

* Consider frailty/independence/tolerability of treatment

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Drug treatment strategy for hypertension - 1

Recommendations	Class	Level
Among all antihypertensive drugs, ACE inhibitors, ARBs, beta-blockers, CCBs, and diuretics (thiazides and thiazide-like such as chlorthalidone and indapamide) have demonstrated effective reduction of BP and CV events in RCTs, and thus are indicated as the basis of antihypertensive treatment strategies.	I	A
Combination treatment is recommended for most hypertensive patients, as initial therapy. Preferred combinations should comprise a RAS blocker (either an ACE inhibitor or an ARB) with a CCB or diuretic. Other combinations of the five major classes can be used.	I	A
It is recommended that beta-blockers are combined with any of the other major drug classes when there are specific clinical situations, e.g. angina, post-myocardial infarction, heart failure, or heart-rate control.	I	A

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Drug treatment strategy for hypertension - 2

Recommendations	Class	Level
It is recommended to initiate an antihypertensive treatment with a two-drug combination, preferably in a SPC. Exceptions are frail older patients and those at low risk and with grade 1 hypertension (particularly if SBP is < 150 mmHg).	I	B
It is recommended that if BP is not controlled with a two-drug combination, treatment should be increased to a three-drug combination, usually a RAS blocker + CCB + thiazide/thiazide-like diuretic, preferably as an SPC.	I	A
It is recommended that if BP is not controlled with a three-drug combination, treatment should be increased by the addition of spironolactone or, if not tolerated, other diuretics such as amiloride or higher doses of other diuretics, a beta-blocker, or an alpha-blocker.	I	B
The combination of two RAS blockers is not recommended.	III	A

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Device-based therapies for hypertension

Recommendation	Class	Level
Use of device-based therapies is not recommended for the routine treatment of hypertension, unless in the context of clinical studies and RCTs, until further evidence regarding their safety and efficacy becomes available.	III	B

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Resistant hypertension characteristics, secondary causes, and contributing factors

Characteristics of patients with resistant hypertension	Causes of secondary resistant hypertension	Drugs and substances that may cause raised BP
Demographics • Older age (especially > 75 years) • Obesity • More common in black people • Excess dietary sodium intake • High baseline BP and chronicity of uncontrolled hypertension	**More common causes** • Primary hyperaldosteronism • Atherosclerotic renovascular disease • Sleep apnoea • CKD	**Prescribed drugs** • Oral contraceptives • Sympathomimetic agents (e.g. decongestants in proprietary cold remedies) • Non-steroidal anti-inflammatory drugs • Cyclosporin • Erythropoietin • Steroids (e.g. prednisolone, hydrocortisone) • Some cancer therapies
Concomitant disease • HMOD: LVH and/or CKD • Diabetes • Atherosclerotic vascular disease • Aortic stiffening and isolated systolic hypertension	**Uncommon causes** • Phaeochromocytoma • Fibromuscular dysplasia • Aortic coarctation • Cushing's disease • Hyperparathyroidism	**Non-prescription drugs** • Recreational drugs (e.g. cocaine, amphetamines, anabolic steroids) • Excess liquorice ingestion • Herbal remedies (e.g. ephedra, ma huang)

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Resistant hypertension

Recommendations	Class	Level
It is recommended that hypertension be defined as resistant to treatment (i.e. resistant hypertension) when: • Optimal doses (or best-tolerated doses) of an appropriate therapeutic strategy, which should include a diuretic (typically an ACE inhibitor or an ARB with a CCB and a thiazide/thiazide-type diuretic), fails to lower clinic SBP and DBP values to < 140 mmHg and/or 90 mmHg, respectively; and • The inadequate control of BP has been confirmed by ABPM or HBPM; and • After exclusion of various causes of pseudo-resistant hypertension (especially poor medication adherence) and secondary hypertension.	I	C
Recommended treatment of resistant hypertension is: • Reinforcement of lifestyle measures, especially sodium restriction. • Addition of low-dose spironolactone to existing treatment. • Or the addition of further diuretic therapy if intolerant to spironolactone, with either eplerenone, amiloride, higher dose thiazide/thiazide-like diuretic, or a loop diuretic. • Or the addition of bisoprolol or doxazosin.	I	B

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Patient characteristics that should raise the suspicion of secondary hypertension

Characteristic
Younger patients (< 40 years) with grade 2 hypertension or onset of any grade of hypertension in childhood
Acute worsening hypertension in patients with previously documented chronically stable normotension
Resistant hypertension
Severe (grade 3) hypertension or a hypertension emergency
Presence of extensive HMOD
Clinical or biochemical features suggestive of endocrine causes of hypertension or CKD
Clinical features suggestive of obstructive sleep apnoea
Symptoms suggestive of phaeochromocytoma or family history of phaeochromocytoma

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Common causes of secondary hypertension

Cause	Prevalence in hypertensive patients
Obstructive sleep apnoea	5–10%
Renal parenchymal disease	2–10%
Renovascular disease: Atherosclerotic renovascular disease Fibromuscular dysplasia	1–10%
Endocrine causes: Primary Aldosteronism Phaeochromocytoma Cushing's syndrome Thyroid disease (hyper- or hypothyroidism) Hyperparathyroidism	 5–15% < 1% < 1% 1–2% < 1%
Other causes: Coarctation of the aorta	 < 1%

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Incidence and typical causes of secondary hypertension according to age

Age group	Per cent with underlying cause	Typical causes
Young children (< 12 years)	70–85	Renal parenchymal disease Coarctation of the aorta Monogenic disorders
Adolescents (12–18 years)	10–15	Renal parenchymal disease Coarctation of the aorta Monogenic disorders
Young adults (19–40 years)	5–10	Renal parenchymal disease Fibromuscular disease (especially in women) Undiagnosed monogenic disorders
Middle-aged adults (41–65 years)	5–15	Primary aldosteronism Obstructive sleep apnoea Cushing's syndrome Phaeochromocytoma Renal parenchymal disease Atherosclerotic renovascular disease
Older adults (> 65years)	5–10	Atherosclerotic renovascular disease Renal parenchymal disease Thyroid disease

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Medications and other substances that may increase BP

Medication/substance	
Oral contraceptive pill	Especially oestrogen containing; cause hypertension in 5% of women, usually mild but can be severe
Diet pills	For example, phenylpropanolamine and sibutramine
Nasal decongestants	For example, phenylephrine hydrochloride and naphazoline hydrochloride
Stimulant drugs	Amphetamine, cocaine, and ecstasy – these substances usually cause acute rather than chronic hypertension
Liquorice	Chronic excessive liquorice use mimics hyperaldosteronism by stimulating the mineralocorticoid receptor and inhibiting cortisol metabolism
Immunosuppressive medications	For example, cyclosporin A (tacrolimus has less effect on BP and rapamycin has almost no effect on BP), and steroids (e.g. corticosteroids, hydrocortisone)
Antiangiogenic cancer therapies	Antiangiogenic drugs, such as VEGF inhibitors (e.g. bevacizumab), tyrosine kinase inhibitors (e.g. sunitinib), and sorafenib, have been reported to increase BP
Other drugs and substances that may raise BP	Anabolic steroids, erythropoietin, non-steroidal anti-inflammatory drugs, herbal remedies (e.g. ephedra, ma huang)

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Rare genetic causes of secondary hypertension

Condition	Phenotype	Mechanism and effect
Liddle syndrome	Hypokalaemia, metabolic alkalosis, low PRA or PRC, low PAC	Increased renal tubular ENaC activity – responds to treatment with amiloride
Apparent mineralocorticoid excess	Hypokalaemia, metabolic alkalosis, low PRA or PRC, low PAC	Decreased 11β-dehydrogenase isoenzyme 2
Gordon syndrome	Hyperkalaemia, metabolic acidosis, low PRA or PRC, low PAC	Over-activity of sodium chloride co-transporter
Geller Syndrome	Pregnancy-exacerbated hypertension; low PRA or PRC, low PAC	Agonist effect of progesterone on the mineralocorticoid receptor
Glucocorticoid remediable hypertension	Hypokalaemia, metabolic alkalosis, low PRC or PRA and increase PAC	Chimeric CYP11β1 to CYP11β2 gene – response to treatment with glucocorticoids

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Diagnostic work-up for patients with a suspected hypertension emergency

Common tests for all potential causes
Fundoscopy is a critical part of the diagnostic work-up
12-lead ECG
Haemoglobin, platelet count, fibrinogen
Creatinine, eGFR, electrolytes, LDH, haptoglobin
Urine albumin:creatinine ratio, urine microscopy for red cells, leucocytes, and casts
Pregnancy test in women of child-bearing age
Specific tests by indication
Troponin, CK-MB (in suspected cardiac involvement, e.g. acute chest pain or acute heart failure) and NT-proBNP
Chest X-ray (fluid overload)
Echocardiography (aortic dissection, heart failure, or ischaemia)
CT angiography of thorax and/or abdomen in suspected acute aortic disease (e.g. aortic dissection)
CT or MRI brain (nervous system involvement)
Renal ultrasound (renal impairment or suspected renal artery stenosis)
Urine drug screen (suspected methamphetamine or cocaine use)

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Hypertensive emergencies requiring immediate BP lowering with i.v. drug therapy

Clinical presentation	Time line and target for BP reduction	First-line treatment	Alternative
Malignant hypertension with or without acute renal failure	Several hours Reduce MAP by 20–25%	Labetalol Nicardipine	Nitroprusside Urapidil
Hypertensive encephalopathy	Immediately reduce MAP by 20–25%	Labetalol Nicardipine	Nitroprusside
Acute coronary event	Immediate reduce SBP to < 140 mmHg	Nitroglycerine Labetalol	Urapidil
Acute cardiogenic pulmonary oedema	Immediately reduce SBP to < 140 mmHg	Nitroprusside or nitroglycerine (with loop diuretic)	Urapidil (with loop diuretic)
Acute aortic dissection	Immediately reduce SBP to < 120 mmHg and heart rate to < 60 bpm	Esmolol AND nitroprusside or nitroglycerine or nicardipine	Labetalol OR metoprolol
Eclampsia and severe pre-eclampsia/HELLP	Immediately reduce SBP to < 160 mmHg and DBP to < 105 mmHg	Labetalol or nicardipine and magnesium sulphate	Consider delivery

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Drug types, doses, and characteristics for treatment of hypertension emergencies - 1

Drug	Onset of action	Duration of action	Dose	Contraindications	Adverse effects
Esmolol	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus; 50–300 µg/kg/min i.v.infusion	Second- or third-degree AV block, systolic heart failure, asthma, bradycardia	Bradycardia
Metoprolol	1–2 min	5–8 h	2.5–5 mg i.v. bolus over 2 minutes; may repeat every 5 minutes to a maximum dose of 15 mg	Second- or third-degree AV block, systolic heart failure, asthma, bradycardia	Bradycardia
Labetalol	5–10 min	3–6 h	0.25–0.5 mg/kg i.v. bolus; 2–4 mg/min i.v. infusion until goal BP is reached, thereafter 5–20mg/h	Second- or third-degree degree AV block; systolic heart failure, asthma, bradycardia	Bronchocon-striction, foetal bradycardia
Fenoldopam	5–15 min	30–60 min	0.1µg/kg/min i.v. infusion, increase every 15 min with 0.05 to 0.1µg/kg/min increments until goal BP is reached	Caution in glaucoma	
Clevidipine	2–3 min	5–15 min	2 mg/h i.v. infusion, increase every 2min with 2 mg/h until goal BP		Headache, reflex tachycardia
Nicardipine	5–15 min	30–40 min	5–15 mg/h i.v. infusion, starting dose 5 mg/h, increase every 15–30 min with 2.5 mg until goal BP, thereafter decrease to 3 mg/h	Liver failure	Headache, reflex tachycardia

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Drug types, doses, and characteristics for treatment of hypertension emergencies - 2

Drug	Onset of action	Duration of action	Dose	Contraindications	Adverse effects
Nitroglycerine	1–5 min	3–5 min	5–200 µg/min i.v. infusion, 5 µg/min increase every 5 min		Headache, reflex tachycardia
Nitroprusside	Immediate	1–2 min	0.3–10 µg/kg/min i.v. infusion, increase by 0.5 µg/kg/min every 5 min until goal BP	Liver/kidney failure (relative)	Cyanide intoxication
Enalaprilat	5–15 min	4–6 h	0.62–1.25 mg i.v. bolus	History of angioedema	
Urapidil	3–5 min	4–6 h	12.5–25 mg i.v. bolus; 5–40 mg/h as continuous infusion		
Clonidine	30 min	4–6 h	150–300 µg i.v. bolus over 5–10 min		Sedation, rebound hypertension
Phentolamine	1–2 min	10–30 min	0.5–1 mg/kg bolus OR 50–300 µg/kg/min i.v. infusion		Tachyarrhythmia, chest pain

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Management of white-coat hypertension

Recommendations	Class	Level
In white-coat hypertensive patients, it is recommended to implement lifestyle changes aimed at reducing CV risk as well as a regular follow-up with periodic out-of-office BP monitoring.	I	C
In patients with white-coat hypertension:		
• Drug treatment may be considered in people with evidence of HMOD or in whom CV risk is high or very high.	IIb	C
• Routine drug treatment is not indicated.	III	C

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Management of masked hypertension

Recommendations	Class	Level
In masked hypertension, lifestyle changes are recommended to reduce CV risk, with regular follow-up, including periodic out-of-office BP monitoring.	I	C
Antihypertensive drug treatment should be considered in masked hypertension to normalize the out-of-office BP based on the prognostic importance of out-of-office BP elevation.	IIa	C
Antihypertensive drug up-titration should be considered in treated patients whose out-of-office BP is not controlled (i.e. masked uncontrolled hypertension), because of the high CV risk of these patients.	IIa	C

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Management of hypertension in pregnancy - 1

Recommendations	Class	Level
In women with gestational hypertension or pre-existing hypertension superimposed by gestational hypertension, or with hypertension and subclinical organ damage or symptoms, initiation of drug treatment is recommended when SBP is ≥ 140 or DBP ≥ 90 mmHg.	I	C
In all other cases, initiation of drug treatment is recommended when SBP is ≥ 150 mmHg or DBP is ≥ 95 mmHg.	I	C
Methyldopa, labetalol, and CCBs are recommended as the drugs of choice for the treatment of hypertension in pregnancy.	I	B (Methyldopa)
	I	C (labetalol or CCBs)
ACE inhibitors, ARBs, or direct renin inhibitors are not recommended during pregnancy.	III	C

Management of hypertension in pregnancy - 2

Recommendations	Class	Level
SBP ≥ 170 mmHg or DBP ≥ 110 mmHg in a pregnant woman is an emergency, and admission to hospital is recommended.	I	C
In severe hypertension, drug treatment with i.v. labetalol or oral methyldopa or nifedipine is recommended.	I	C
The recommended treatment for hypertensive crisis is i.v. labetalol or nicardipine and magnesium.	I	C
In pre-eclampsia associated with pulmonary oedema, nitroglycerin given as an i.v. infusion is recommended.	I	C
In women with gestational hypertension or mild pre-eclampsia, delivery is recommended at 37 weeks.	I	B
It is recommended to expedite delivery in pre-eclampsia with adverse conditions such as visual disturbances or haemostatic disorders.	I	C

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Hypertension in ethnic groups

Recommendations	Class	Level
It is recommended that a two-drug combination, usually as an SPC, is used as initial therapy for most black patients.	I	C
In black patients, initial antihypertensive treatment should include a diuretic or a CCB, either in combination or with a RAS blocker.	I	B
In other ethnic groups, BP-lowering treatment may be based on the core treatment algorithm.	IIb	C

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Treatment strategies in people with diabetes

Recommendations	Class	Level
Antihypertensive drug treatment is recommended for people with diabetes when office BP is ≥ 140/90 mmHg.	I	A
In people with diabetes receiving BP-lowering drugs it is recommended:		
• To target SBP to 130 mmHg and lower, if tolerated, but not lower than 120 mmHg.	I	A
• In older people (aged ≥ 65 years), to target to an SBP range of 130 - 139 mmHg.	I	A
• To target the DBP to < 80 mmHg, but not lower than 70 mmHg.	I	C
It is recommended to initiate treatment with a combination of a RAS blocker with a CCB or thiazide/thiazide-like diuretic.	I	A
Simultaneous administration of two RAS blockers, e.g. and ACE inhibitor and ARB, is not indicated.	III	A

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Therapeutic strategies for treatment of hypertension in CKD

Recommendations	Class	Level
In patients with diabetic or non-diabetic CKD, it is recommended that an office BP of ≥ 140/90 mmHg be treated with lifestyle advice and BP-lowering medication.	I	A
In patients with diabetic or non-diabetic CKD:		
• It is recommended to lower SBP to a range of 130-139 mmHg.	I	A
• Individualized treatment should be considered according to its tolerability and impact on renal function and electrolytes.	IIa	C
RAS blockers are more effective at reducing albuminuria than other antihypertensive agents, and are recommended as part of the treatment strategy in hypertensive patients in the presence of microalbuminuria or proteinuria.	I	A
A combination of a RAS blocker with a CCB or a diuretic is recommended as initial therapy.	I	A
A combination of two RAS blockers is not recommended.	III	A

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Therapeutic strategies in hypertensive patients with CAD

Recommendations	Class	Level
In patients with CAD receiving BP-lowering drugs, it is recommended:		
• To target SBP to ≤130 mmHg, if tolerated, but not <120 mmHg.	I	A
• In older patients (aged ≥ 65 years), to target to a SBP range of 130–140 mmHg.	I	A
• To target DBP to < 80 mmHg, but not < 70 mmHg.	I	C
In hypertensive patients with a history of myocardial infarction, beta-blockers and RAS blockers are recommended as part of treatment.	I	A
In patients with symptomatic angina, beta-blockers and/or CCBs are recommended.	I	A

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Therapeutic strategies in hypertensive patients with heart failure or LVH

Recommendations	Class	Level
In hypertensive patients with heart failure (with reduced or preserved ejection fraction), BP-lowering treatment should be considered if BP is ≥ 140/90 mmHg.	IIa	B
In patients with HFrEF, it is recommended that BP-lowering treatment comprises an ACE inhibitor or ARB and a beta-blocker and diuretic and/or mineralocorticoid receptor antagonist if required.	I	A
Dihydropyridine CCBs may be added if BP control is not achieved.	IIb	C
In patients with HFpEF, BP-treatment threshold and target values should be the same as for HFrEF.	IIa	B
Because no specific drug has proven its superiority, all major agents can be used.	I	C
In all patients with LVH:		
• It is recommended to treat with an RAS blocker in combination with a CCB or diuretic.	I	A
• SBP should be lowered to a range of 120–130 mmHg.	IIa	B

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Therapeutic strategies in hypertensive patients with acute stroke and cerebrovascular disease - 1

Recommendations	Class	Level
In patients with acute intracerebral haemorrhage:		
• Immediate BP lowering is not recommended for patients with SBP < 220 mmHg.	III	A
• In patients with SBP ≥ 220 mmHg, careful acute BP lowering with i.v. therapy, to < 180 mmHg should be considered.	IIa	B
In acute ischaemic stroke, routine BP lowering with antihypertensive therapy is not recommended, with the exceptions:	III	A
• In patients with acute ischaemic stroke who are eligible for i.v. thrombolysis, BP should be carefully lowered and maintained to < 180/105 mmHg for at least the first 24 h after thrombolysis.	IIa	B
• In patients with markedly elevated BP who do not receive fibrinolysis, drug therapy may be considered, based on clinical judgement, to reduce BP by 15% during the first 24 h after the stroke onset.	IIb	C

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Therapeutic strategies in hypertensive patients with acute stroke and cerebrovascular disease - 2

Recommendations	Class	Level
In hypertensive patients with an acute cerebrovascular event, antihypertensive treatment is recommended:		
• Immediately for TIA.	I	A
• After several days in ischaemic stroke.	I	A
In all hypertensive patients with ischaemic stroke or TIA, a SBP target range of 120–130 mmHg should be considered.	IIa	B
The recommended antihypertensive drug treatment strategy for stroke prevention is a RAS blocker plus a CCB or a thiazide-like diuretic.	I	A

Therapeutic strategies in hypertensive patients with AF

Recommendations	Class	Level
In patients with AF, screening for hypertension is recommended.	I	C
A beta-blocker or non-dihydropyridine CCB should be considered as part of the treatment of hypertension if rate control is needed.	IIa	B
Stroke prevention with oral anticoagulation is recommended in patients with AF and hypertension and a CHA_2DS_2-VASc score of ≥ 2 in men and ≥ 3 in women.	I	A
Stroke prevention with oral anticoagulants should be considered in AF patients with hypertension, even when hypertension is the single additional risk factor (CHA_2DS_2-VASc score of 1).	IIa	B
Oral anticoagulants should be used with caution in patients with marked BP elevation (SBP ≥ 180 mmHg and/or DBP ≥ 100 mmHg) and the aim should be to lower SBP to at least < 140 mmHg and SBP lowering to < 130 should be considered. If this is not possible, then patients should make an informed decision that they accept that the stroke protection provided by the anticoagulant will be associated with higher bleeding risk.	IIa	B

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Therapeutic strategies in hypertensive patients with LEAD

Recommendations	Class	Level
BP-lowering treatment is recommended to reduce CV risk.	I	A
A combination of a RAS blocker, CCB, or diuretic should be considered as initial therapy.	IIa	B
Beta-blockers may also be considered.	IIb	C

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Perioperative management of hypertension

Recommendations	Class	Level
It is recommended that newly diagnosed hypertensive patients who are scheduled for elective surgery should be preoperatively screened for HMOD and CV risk.	I	C
It is recommended to avoid large perioperative BP fluctuations during the perioperative period.	I	C
Non-cardiac surgery may not be deferred in patients with grade 1 or 2 hypertension (SBP < 180 mmHg; DBP < 110 mmHg).	IIb	C
Perioperative continuation of beta-blockers is recommended in hypertensive patients on chronic treatment with these drugs.	I	B
Abrupt discontinuation of beta-blockers or centrally acting agents (e.g. clonidine) is potentially harmful and is not recommended.	III	B
Transient preoperative discontinuation of RAS blockers should be considered in patients with hypertension undergoing non-cardiac surgery.	IIa	C

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Treatment of CV risk factors associated with hypertension - 1

Recommendations	Class	Level
CV risk assessment with the SCORE system is recommended for hypertensive patients who are not already at high or very risk due to established CVD, renal disease, or diabetes.	I	B
For patients at very high CV risk, statins are recommended to achieve LDL-C levels of < 1.8 mmol/L (70 mg/dL), or a reduction of ≥ 50% if the baseline LDL-C is 1.8–3.5 mmol/L (70–135 mg/dL).	I	B
For patients at high CV risk, statins are recommended to achieve an LDL-C goal of < 2.6 mmol/L (100 mg/dL) or a reduction of ≥ 50% if the baseline LDL-C is 2.6–5.2 mmol/L (100–200 mg/dL).	I	B
For patients at low to moderate CV risk, statins should be considered, to achieve an LDL-C value of < 3.0 mmol/L (115 mg/dL).	IIa	C

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Treatment of CV risk factors associated with hypertension - 2

Recommendations	Class	Level
Antiplatelet therapy, in particular low-dose aspirin, is recommended for secondary prevention in hypertensive patients.	I	A
Aspirin is not recommended for primary prevention in hypertensive patients without CVD.	III	A

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Interventions that may improve drug adherence in hypertension

Physician level
Patient level
Drug-treatment level
Health-system level

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Gaps in evidence - 1

Gaps in the evidence and need for further studies
What is the optimal population-screening programme for detecting hypertension?
What is the optimal method to measure BP in patients with AF?
What is the incremental benefit for CV-risk prediction of the addition of out-of-office BP (HBPM and ABPM) to office BP measurement?
What is the incremental benefit, over the SCORE system, of measures of HMOD in reclassifying CV risk of patients with hypertension?
What are the appropriate BP thresholds and targets for drug treatment in younger hypertensive patients?
What are the optimal BP treatment targets according to HBPM and ABPM?
What are the outcome benefits associated with antihypertensive treatment in patients with resistant hypertension?
What are the benefits of BP treatment for patients with BP in the high-normal range?
What baseline level of CV risk predicts treatment benefit?
More data on the benefits of BP treatment in the very elderly and the influence of frailty
Outcome-based comparison between office BP- and out-of-office BP-guided treatment
Outcome-based comparison between treatments guided by BP control and by HMOD reductions, especially in younger patients

Gaps in evidence - 2

Gaps in the evidence and need for further studies
More outcome studies of the optimal SBP-treatment target for patients at different levels of baseline CV risk and with different comorbidities, including diabetes and CKD
More outcome studies of the optimal DBP treatment target
Impact of single pill versus multiple drug treatment strategies on adherence to treatment, BP control, and clinical outcomes
Outcome-based comparison between treatment strategies based on initial monotherapy versus initial combination therapy
What is the optimal salt intake to reduce CV and mortality risk?
What are the long-term outcome benefits resulting from the recommended lifestyle changes?
Outcome-based comparison between treatments based on thiazide versus thiazide-like diuretics
Incremental value of central versus peripheral BP in risk estimation and risk reduction by treatment
Outcome-based comparison of BP treatment with classical versus vasodilator beta-blockers
Optimal BP treatment targets in specific clinical conditions (e.g. diabetes, CKD, post-stroke)
Protective effect of antihypertensive treatment in patients with cognitive dysfunction or dementia
Role of antihypertensive treatment in white-coat hypertension
Role of antihypertensive treatment in masked hypertension
Optimal treatment of hypertension in different ethnic groups

Key messages 1-3

1. **BP, epidemiology, and risk.**
   Globally, over 1 billion people have hypertension. As populations age and adopt more sedentary lifestyles, the worldwide prevalence of hypertension will continue to rise towards 1.5 billion by 2025. Elevated BP is the leading global contributor to premature death, accounting for almost 10 million deaths in 2015, 4.9 million due to ischaemic heart disease and 3.5 million due to stroke. Hypertension is also a major risk factor for heart failure, AF, CKD, PAD, and cognitive decline.

2. **Definition of hypertension.**
   The classification of BP and the definition of hypertension is unchanged from previous European guidelines, and is defined as an office SBP ≥ 140 and/or DBP ≥ 90 mmHg, which is equivalent to a 24-h ABPM average of ≥ 130/80 mmHg, or a HBPM average ≥ 135/85 mmHg.

3. **Screening and diagnosis of hypertension.**
   Hypertension is usually asymptomatic (hence the term "silent killer"). Because of its high prevalence, screening programmes should be established to ensure that BP is measured in all adults, at least every 5 years and more frequently in people with a high-normal BP. When hypertension is suspected because of an elevated screening BP, the diagnosis of hypertension should be confirmed either by repeated office BP measurements, over a number of visits, or by out-of-office BP measurement using 24-h ABPM or HBPM.

Key messages 4-6

4. **The importance of cardiovascular risk assessment and detection of HMOD.** Other CV risk factors such as dyslipidaemia and metabolic syndrome frequently cluster with hypertension. Thus, unless the patient is already at high or very high risk due to established CVD, formal CV risk assessment is recommended using the SCORE system. It is important to recognise, however, that the presence of HMOD, especially LVH, CKD, or advanced retinopathy, further increases the risk of CV morbidity and mortality, and should be screened for as part of risk assessment in hypertensive patients because the SCORE system alone may underestimate their risk.

5. **Think: could this patient have secondary hypertension?** For most people with hypertension, no underlying cause will be detected. Secondary (and potentially remediable) causes of hypertension are more likely to be present in people with young onset of hypertension (< 40 years), people with severe or treatment-resistant hypertension, or people who suddenly develop significant hypertension in midlife on a background of previously normal BP. Such patients should be referred for specialist evaluation.

6. **Treatment of hypertension – importance of lifestyle interventions.** The treatment of hypertension involves lifestyle interventions and drug therapy. Many patients with hypertension will require drug therapy, but lifestyle interventions are important because they can delay the need for drug treatment or complement the BP-lowering effect of drug treatment. Moreover, lifestyle interventions such as sodium restriction, alcohol moderation, healthy eating, regular exercise, weight control and smoking cessation, all have health benefits beyond their impact on blood pressure.

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Key messages 7-20

7. **When to consider drug treatment of hypertension.**
8. **Special considerations in frail and older patients.**
9. **How low should SBP be lowered?**
10. **BP targets in old and very old patient.**
11. **BP targets in patients with diabetes and/or CKD.**
12. **How low should DBP be lowered?**
13. **The need to do better on BP control.**
14. **Start treatment in most patients with two drugs, not one.**
15. **A single pill strategy to treat hypertension.**
16. **A simplified drug-treatment algorithm.**
17. **Hypertension in women and in pregnancy.**
18. **Is there a role for device-based therapy for the treatment of hypertension?**
19. **Managing CV disease risk in hypertensive patients, beyond BP – statins.**
20. **Managing CV disease risk in hypertensive patients, beyond BP – antiplatelet therapy.**

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To do, and not to do, messages from the guidelines - 1

Recommendations	Class	Level
Classification of BP		
It is recommended that BP be classified as optimal, normal, high-normal, or grades 1–3 hypertension, according to office BP.	**I**	**C**
Screening for hypertension		
Screening programmes for hypertension are recommended. All adults (≥ 18 years) should have their office BP measured and recorded in their medical file and be aware of their BP.	**I**	**B**
Diagnosis of hypertension		
It is recommended to base the diagnosis of hypertension on: • Repeated office BP measurements on more than one visit, except when hypertension is severe (e.g. grade 3 and especially in high-risk patients). At each visit, three BP measurements should be recorded, 1–2 min apart, and additional measurements performed if the first two readings differ by > 10 mmHg. The patient's BP is the average of the last two BP readings.	**I**	**C**
or • Out-of-office BP measurement with ABPM and/or HBPM, provided that these measurements are logistically and economically feasible.	**I**	**C**

Williams, Mancia et al., J Hypertens 2018;36:1953-2041 and Eur Heart J 2018;39:3021-3104

To do, and not to do, messages from the guidelines - 2

Recommendations	Class	Level
Office BP thresholds for the initiation of drug treatment for hypertension		
Prompt initiation of BP-lowering drug treatment is recommended in patients with grade 2 or 3 hypertension at any level of CV risk, simultaneous with the initiation of lifestyle changes.	I	A
In patients with grade 1 hypertension:		
• Lifestyle interventions are recommended to determine if this will normalize BP.	I	B
• In patients with grade 1 hypertension at low–moderate risk, and without evidence of HMOD, BP-lowering drug treatment is recommended if the patient remains hypertensive after a period of lifestyle intervention.	I	A
• In patients with grade 1 hypertension and at high risk or with evidence of HMOD, prompt initiation of drug treatment is recommended simultaneously with lifestyle interventions.	I	A
In fit older patients with hypertension (even if age > 80 years), BP-lowering drug treatment and lifestyle intervention are recommended when SBP is ≥ 160 mmHg.	I	A
BP-lowering drug treatment and lifestyle intervention are recommended in fit older patients (> 65 years but not > 80 years) when SBP is in the grade 1 range (140–159 mmHg), provided that treatment is well tolerated.	I	A
In patients with high-normal BP (130–139/85–89 mmHg), lifestyle changes are recommended.	I	A
Withdrawal of BP-lowering drug treatment on the basis of age, even when patients attain an age of ≥ 80 years, is not recommended, provided that treatment is well tolerated.	III	A

Williams, Mancia et al., J Hypertens 2018;36:1953-2041 and Eur Heart J 2018;39:3021-3104

To do, and not to do, messages from the guidelines - 3

Recommendations	Class	Level
Office BP treatment targets		
It is recommended that the first objective of treatment should be to lower BP to < 140/90 mmHg in all patients, and provided that the treatment is well tolerated, treated BP values should be targeted to 130/80 mmHg or lower, in most patients.	**I**	**A**
In patients < 65 years receiving BP-lowering drugs, it is recommended that SBP should be lowered to a BP range of 120 to < 130 mmHg in most patients.[d]	**I**	**A**
In older patients (aged ≥ 65 years) receiving BP-lowering drugs, it is recommended that SBP should be targeted to a BP range of 130 to < 140 mmHg.	**I**	**A**

Williams, Mancia et al., J Hypertens 2018;36:1953-2041 and Eur Heart J 2018;39:3021-3104

To do, and not to do, messages from the guidelines - 4

Recommendations	Class	Level
Treatment of hypertension – lifestyle interventions		
Salt restriction to < 5 g per day is recommended.	I	A
It is recommended to restrict alcohol consumption to < 14 units per week for men and < 8 units per week for women.	I	A
Increased consumption of vegetables, fresh fruits, fish, nuts, unsaturated fatty acids (olive oil), low consumption of red meat, and consumption of low-fat dairy products are recommended.	I	A
Body-weight control is indicated to avoid obesity (BMI > 30 kg/m^2 or waist circumference > 102 cm in men and > 88 cm in women) and aim for a healthy BMI (about 20–25 kg/m^2) and waist circumference values (< 94 cm in men and < 80 cm in women) to reduce BP and CV risk.	I	A
Regular aerobic exercise (e.g. ≥ 30 min of moderate dynamic exercise on 5–7 days per week) is recommended.	I	A
Smoking cessation and supportive care and referral to smoking cessation programmes are recommended.	I	B
It is recommended to avoid binge drinking.	III	A

To do, and not to do, messages from the guidelines - 5

Recommendations	Class	Level
Treatment of hypertension – drug treatment		
Combination treatment is recommended for most hypertensive patients, as initial therapy. Preferred combinations should comprise a RAS blocker (either an ACE inhibitor or an ARB) with a CCB or diuretic. Other combinations of the five major classes can be used. It is recommended that beta-blockers are combined with any of the other major drug classes when there are specific clinical situations (e.g. angina, post-myocardial infarction, heart failure, or heart-rate control).	**I** **I**	**A** **A**
It is recommended to initiate an antihypertensive treatment with a two-drug combination, preferably in an SPC. Exceptions are frail older patients and those at low risk and with grade 1 hypertension (particularly if SBP is < 150 mmHg).	**I**	**B**
It is recommended that if BP is not controlled with a two-drug combination, treatment should be increased to a three-drug combination, usually a RAS blocker + CCB + thiazide/thiazide-like diuretics, preferably as an SPC.	**I**	**A**
It is recommended that if BP is not controlled with a three-drug combination, treatment should be increased by the addition of spironolactone or, if not tolerated, other diuretics such as amiloride or higher doses of other diuretics, a beta-blocker, or alpha-blocker.	**I**	**B**
The combination of two RAS blockers is not recommended.	**III**	**A**

To do, and not to do, messages from the guidelines - 6

Recommendations	Class	Level
Treatment of hypertension – device-based therapies		
Use of device-based therapies is not recommended for the routine treatment of hypertension, unless in the context of clinical studies and RCTs, until further evidence regarding their safety and efficacy becomes available.	III	B
Management of CVD risk in hypertensive patients		
CV risk assessment with the SCORE system is recommended for hypertensive patients who are not already at high or very risk due to established CVD, renal disease, or diabetes.	I	B
For patients at high or very high CV risk, statins are recommended.	I	B
Antiplatelet therapy, in particular low-dose aspirin, is recommended for secondary prevention in hypertensive patients.	I	A
Aspirin is not recommended for primary prevention in hypertensive patients without CVD.	III	A
Routine genetic testing for hypertensive patients is not recommended.	III	C

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