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ESC/ESH GUIDELINES

2018 ESC/ESH Guidelines for the management of arterial hypertension

Arterijska hipertenzija

Novootkriveni hipertoničar

Kombinacije lijekova

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Changes in recommendations	
2013	**2018**
Diagnosis	**Diagnosis**
Office BP is recommended for screening and diagnosis of hypertension.	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–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.
BP treatment targets	**BP treatment targets**
An SBP goal of <140 mmHg is recommended.	• 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 120–129 mmHg in most patients.

BP treatment targets in older patients (65–80 years)	BP treatment targets in older patients (65–80 years)
An SBP target of between 140–150 mmHg is recommended for older patients (65–80 years).	In older patients (≥65 years), it is recommended that SBP should be targeted to a BP range of 130–139 mmHg.
BP treatment targets in patients aged over 80 years	**BP treatment targets in patients aged over 80 years**
An SBP target between 140–150 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.	An SBP target range of 130–139 mmHg is recommended for people older than 80 years, if tolerated.
DBP targets	**DBP targets**
A DBP target of <90 mmHg is always recommended, except in patients with diabetes, in whom values <85 mmHg are recommended.	A DBP target of <80 mmHg should be considered for all hypertensive patients, independent of the level of risk and comorbidities.
Initiation of drug treatment	**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.	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	**Resistant hypertension**
Mineralocorticoid receptor antagonists, amiloride, and the alpha-1 blocker doxazosin should be considered if no contraindication exists.	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	**Device-based therapy for hypertension**
In case of ineffectiveness of drug treatment, invasive procedures such as renal denervation and baroreceptor stimulation may be considered.	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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- **optimalan** (<120 mmHg sistolički i <80 mmHg dijastolički)
- **normalan** (120-129 mmHg sistolički i 80-84 mmHg dijastolički),
- **visoko-normalan** (130-139 mmHg sistolički i/ili 85-89 mmHg dijastolički),
- **1. stupanj hipertenzije** (140-159 mmHg sistolički i/ili 90-99 mmHg dijastolički),
- **2. stupanj hipertenzije** (160-179 mmHg sistolički i/ili 100-109 mmHg dijastolički),
- **3. stupanj hipertenzije** (≥180 mmHg sistolički i/ili ≥110 mmHg dijastolički), te
- **izolirana sistolička hipertenzija** (≥140 mmHg sistolički i <90 mmHg dijastolički).

Table 3 **Classification of office blood pressure[a] and definitions of hypertension grade[b]**

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[b]	≥140	and	<90

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BP = blood pressure; SBP = systolic blood pressure.
[a]BP category is defined according to seated clinic BP and by the highest level of BP, whether systolic or diastolic.
[b]Isolated systolic hypertension is graded 1, 2, or 3 according to SBP values in the ranges indicated.
The same classification is used for all ages from 16 years.

Table 5 Ten year cardiovascular risk categories (Systematic COronary Risk Evaluation 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 or 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, who may be at 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%**

BP = blood pressure; CKD = chronic kidney disease; CVD = cardiovascular disease; eGFR = estimated glomerular filtration rate; LVH = left ventricular hypertrophy; TIA = transient ischaemic attack; PAD = peripheral artery disease; SCORE = Systematic COronary Risk Evaluation.

Table 4 Factors influencing cardiovascular risk in patients with hypertension

Demographic characteristics and laboratory parameters
Sex[a] (men >women)
Age[a]
Smoking (current or past history)[a]
Total cholesterol[a] and HDL-C
Uric acid
Diabetes[a]
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/min)
Asymptomatic HMOD
Arterial stiffening: Pulse pressure (in older people) ≥60 mmHg Carotid–femoral PWV >10 m/s
ECG LVH (Sokolow–Lyon index >35 mm, or R in aVL ≥11 mm; Cornell voltage duration product >2440 mm.ms, or Cornell voltage >28 mm in men or >20 mm in women)
Echocardiographic LVH [LV mass index: men >50 g/m$^{2.7}$; women >47 g/m$^{2.7}$ (height in m$^{2.7}$); indexation for BSA may be used in normal-weight patients; LV mass/BSA g/m^2 >115 (men) and >95 (women)]
Microalbuminuria (30–300 mg/24 h), or elevated albumin–creatinine ratio (30–300 mg/g; 3.4–34 mg/mmol) (preferentially on morning spot urine)[b]
Moderate CKD with eGFR >30–59 mL/min/1.73 m^2 (BSA) or severe CKD eGFR <30 mL/min/1.73 m^2 [b]
Ankle-brachial index <0.9
Advanced retinopathy: haemorrhages or exudates, papilloedema
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

Promjena izraza ‘target organ damage TOD ’ u HMOD

‘’More accurately describes hypertension-induced structural and/or functional changes in major organs (i.e. the heart, brain, retina, kidney, and vasculature) (Table 4)

Hypertension-mediated-organ-damage= **HMOD**

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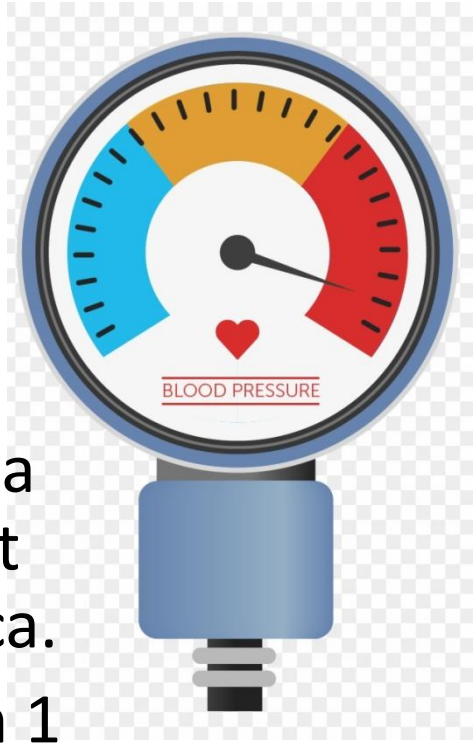
Novootkriveni hipertoničar

- **Anamneza** (osobna i obiteljska anamneza, lijekovi, navike i funkcije)
- **Fizikalni pregled**
  Mjerenje tlaka u razmaku od 1-2 minute barem 2 mjerenja. Kod prvog pregleda izmjeriti arterijski tlak na obje ruke (periferna vaskularna bolest), kao referentnu vrijednost uzeti onu višu. Orukvicu postaviti u razini srca.
- *Ortostatska hipotenzija* (TA u ležanju, potom 1 i 5 minuta nakon zauzimanja stojećeg položaja).
  Dg. hipertenzije 2 mjerenja po pregledu, 2-3 pregleda.



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Pravilno mjerenje tlaka obavlja se nakon 5 minuta sjedenja s poduprtim leđima i rukom koja je u razini srca. Početno mjerenje treba provesti na obje ruke te ako postoji značajna razlika u izmjerenim vrijednostima tlaka, preporučuje se naredna mjerenja provoditi na ruci na kojoj su izmjerene više vrijednosti. Značajna razlika tlaka je iznad 20 mmHg sistoličkog i 10 mmHg dijastoličkog tlaka te je tada potrebno bolesnika uputiti na daljnju obradu.

Osim ambulantnog mjerenja arterijskog tlaka, koriste se i kućno mjerenje arterijskog tlaka samomjeračima (MATS) i kontinuirano mjerenje arterijskog tlaka (KMAT).

Table 9 Definitions of hypertension according to office, ambulatory, and home blood pressure levels

Category	SBP (mmHg)		DBP (mmHg)
Office BP[a]	≥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

BP = blood pressure; DBP = diastolic blood pressure; SBP = systolic blood pressure.
[a]Refers to conventional office BP rather than unattended office BP.

Table 8 Office blood pressure measurement

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 patents 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.[a]
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-dependant increases in BP.
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 min and 3 min after standing from a 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, people with diabetes, and people with other conditions in which orthostatic hypotension may frequently occur.
Record heart rate and use pulse palpation to exclude arrhythmia.

AF = atrial fibrillation; BP = blood pressure; DBP = diastolic blood pressure; SBP = systolic blood pressure.
[a]Most automatic devices are not validated for BP measurement in patients with AF and will record the highest individual systolic pressure wave form rather than an average of several cardiac cycles. This will lead to overestimation of BP.

Pravilno mjerenje AT

- ***Za kućno mjerenje arterijskog tlaka*** vrijede ista pravila kao i kod ordinacijskoga mjerenja te se ne podržava uporaba tlakomjera za zapešće ili mjerenje na prstu. Potrebno je mjeriti krvni tlak 6-7 dana zaredom s dva mjerenja ujutro i dva mjerenja na večer te treba izbjegavati cigarete i kofein 30 minuta prije mjerenja krvnog tlaka. Trebalo bi izračunati srednju vrijednost krvnog tlaka, a **definicija hipertenzije za kućno mjerenje je ≥135/85 mmHg.**
- Granične vrijednosti za definiciju hipertenzije kod KMAT-a su iznad ≥130/80 mmHg tijekom 24 sata, ≥135/85 mmHg za prosjek tijekom dana i ≥120/70 mmHg za prosjek tijekom noći.

Obrada bolesnika

- uzeti detaljnu obiteljsku i osobnu anamnezu,
- učiniti fizikalni pregled,
- procijeniti sveukupni kardiovaskularni rizik i HMOD (srce, krvne žile, mozak, bubreg, oči), te prema potrebi, uraditi probir na sekundarnu hipertenziju.
- U obradi hipertenzije svakako bi trebalo učiniti EKG i laboratorijske nalaze (KKS, glukoza, lipidogram, elektroliti, kreatinin, urea, jetrene enzime te urin).
- Daljnju obradu bi trebalo planirati ovisno o učinjenim nalazima, anamnezi te kliničkom statusu (UZV srca, ergometrija, UZV abdomena, itd.)

Table 13 Key steps in physical examination

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

BMI = body mass index; BP = blood pressure; HMOD = hypertension-mediated organ damage.

Table 14 Routine workup 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

eGFR = estimated glomerular filtration rate; ECG = electrocardiogram; HbA_{1c} = haemoglobin A1c.

Maskirana hipertenzija predstavlja klinički entitet kod kojeg se kod pacijenata povišene vrijednosti arterijskog tlaka bilježe kod kuće, dok se u ordinaciji mjere normotenzivne vrijednosti. Maskirana se hipertenzija povezuje s povišenim rizikom za nastanak oštećenja ciljnih organa u hipertenziji te se svakako preporučuje promjene životnih navika i redovito praćenje, a samo farmakološko liječenje još nije u potpunosti definirano pa su potrebna daljnja istraživanja.

Hipertenzija bijelog ogrtača predstavlja klinički entitet kod kojega se povišene vrijednosti arterijskog tlaka bilježe u ordinaciji, a normotenzivne prilikom KMAT-a i MATS-a. Također je povezana s povišenim kardiovaskularnim rizikom. Kao terapijska mjera, preporučuje se promjena životnih navika, zatim češće praćenje, a farmakološko liječenje nije do kraja razjašnjeno.

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- **Rezistentna hipertenzija** odnosi se na nemogućnost odgovarajuće kontrole arterijskog tlaka (snižavanje <140/90 mmHg) s najmanje tri klase antihipertenziva (tipično uključuje diuretik, ACE-inhibitor te blokator kalcijskih kanala), a neodgovarajuće vrijednosti arterijskog tlaka su dokumentirane MATS-om ili KMAT-om.

- **Sekundarna hipertenzija** se odnosi na onu hipertenziju kod koje postoji specifičan uzrok koji se može liječiti, a probir na sekundarnu hipertenziju se vrši kod posebnih skupina bolesnika (npr. mlađi od 40 godina, akutna pogoršanja inače normotenzivnih bolesnika, 3. stupanj hipertenzije, sumnja na opstruktivnu apneju u spavanju, na feokromocitom ili endokrinološke uzroke, itd). Sekundarnu hipertenziju mogu uzrokovati i neki lijekovi, primjerice nesteroidni antireumatici ili kortikosteroidi.

Table 25 **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 (see section 8.1)
Severe (grade 3) hypertension or a hypertension emergency (see section 8.3)
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

CKD = chronic kidney disease; HMOD = hypertension-mediated organ damage.

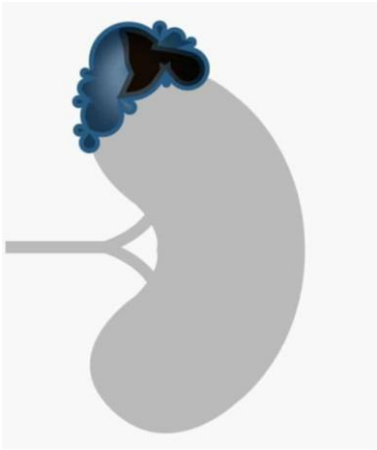

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Table 10 **Comparison of ambulatory blood pressure monitoring and home blood pressure monitoring**

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[a]

ABPM = ambulatory blood pressure monitoring; BP = blood pressure; HBPM = home blood pressure monitoring.
[a]Techniques are being developed to enable nocturnal BP measurement with home BP devices.

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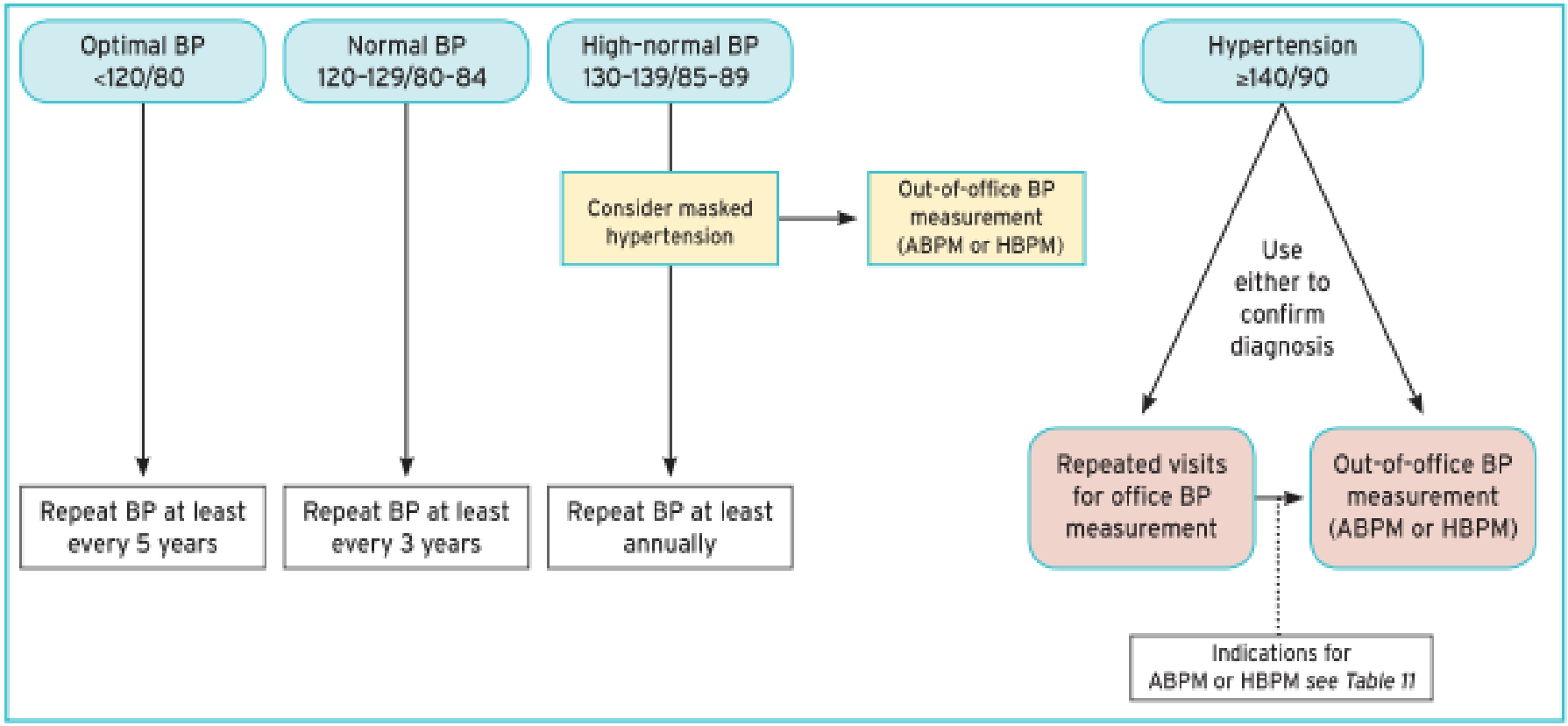

Figure 2 Screening and diagnosis of hypertension. ABPM = ambulatory blood pressure monitoring; BP = blood pressure; HBPM = home blood pressure monitoring.

[a]After detecting a specific BP category on screening, either confirm BP elevation with repeated office BP measurements on repeat visits or arrange use of out-of-office BP to confirm the diagnosis of hypertension.

Table 15 Assessment of hypertension-mediated organ damage

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
More detailed screening for HMOD	
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); see section 8.2 regarding screening for secondary hypertension • 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 LEAD
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

ABI = ankle-brachial index; CKD = chronic kidney disease; CT = computed tomography; ECG = electrocardiogram; eGFR = estimated glomerular filtration rate; HMOD = hypertension-mediated organ damage; LEAD = lower extremity artery disease; LVH = left ventricular hypertrophy; MRI = magnetic resonance imaging; PWV = pulse wave velocity.

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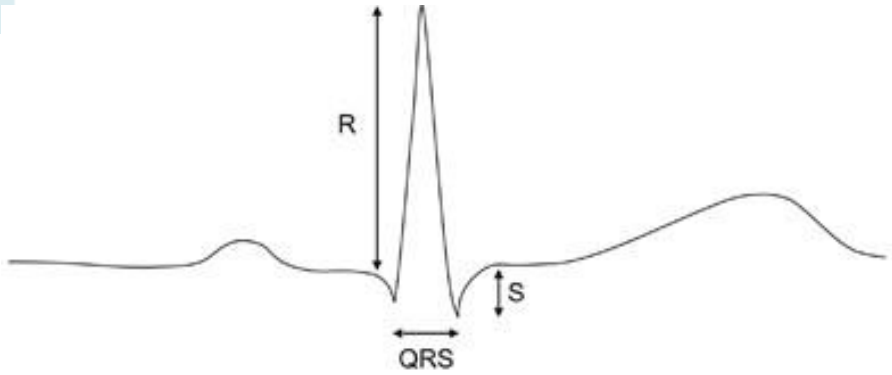
Table 16 The most commonly used simple criteria and recognised cut-off points for definitions of electrocardiogram left ventricular hypertrophy

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)[a]	>28 mm (men)
Cornell duration product[b]	>20 mm (women)
	>2440 mm.ms



Sokolow-Lyon voltage (mV) = $RV_{5(6)}+SV_1$

Cornell product (mm × ms) = $(R_aV_L+SV_3)$ × QRS duration (men)

$(R_aV_L+SV_3+6)$ × QRS duration (women)

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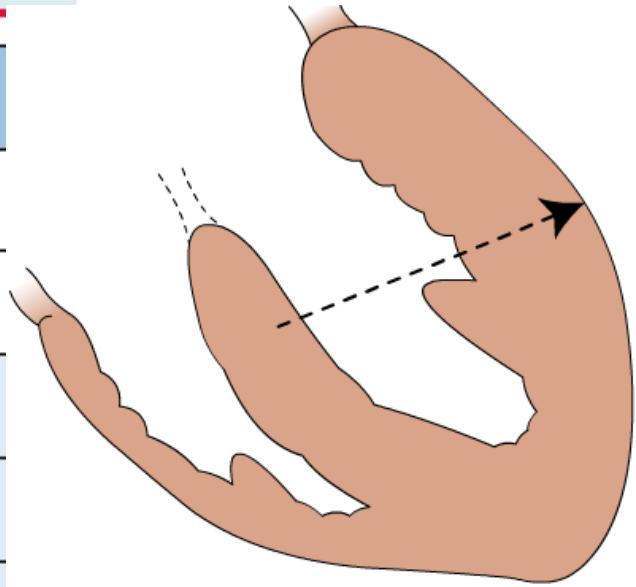

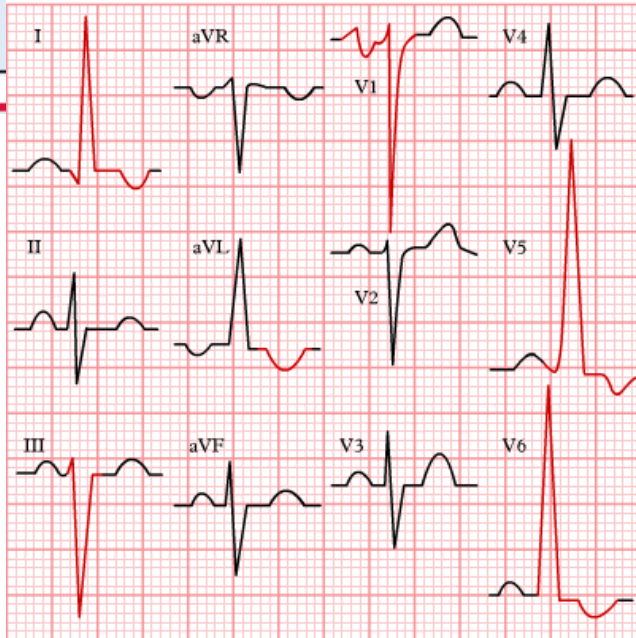

Koga uputiti u sekundarnu/tercijarnu zdravstvenu ustanovu?

- Bolesnike sa suspektnom sekundarnom hipertenzijom
- Bolesnike mlađe životne dobi (<40 godina) s drugim stupnjom hipertenzije ili višim kod kojih je sekundarna hipertenzija isključena
- Bolesnike sa rezistentnom hipertenzijom
- Bolesnike kod kojih bi detaljnija procjena HMOD-a mogla utjecati na odluku o liječenju
- Bolesnike s iznenadnim skokom arterijskog tlaka, kod kojih je TA prethodno bio normalan
- Druge kliničke okolnosti u kojima liječnik misli da je potrebna viša specijalistička procjena

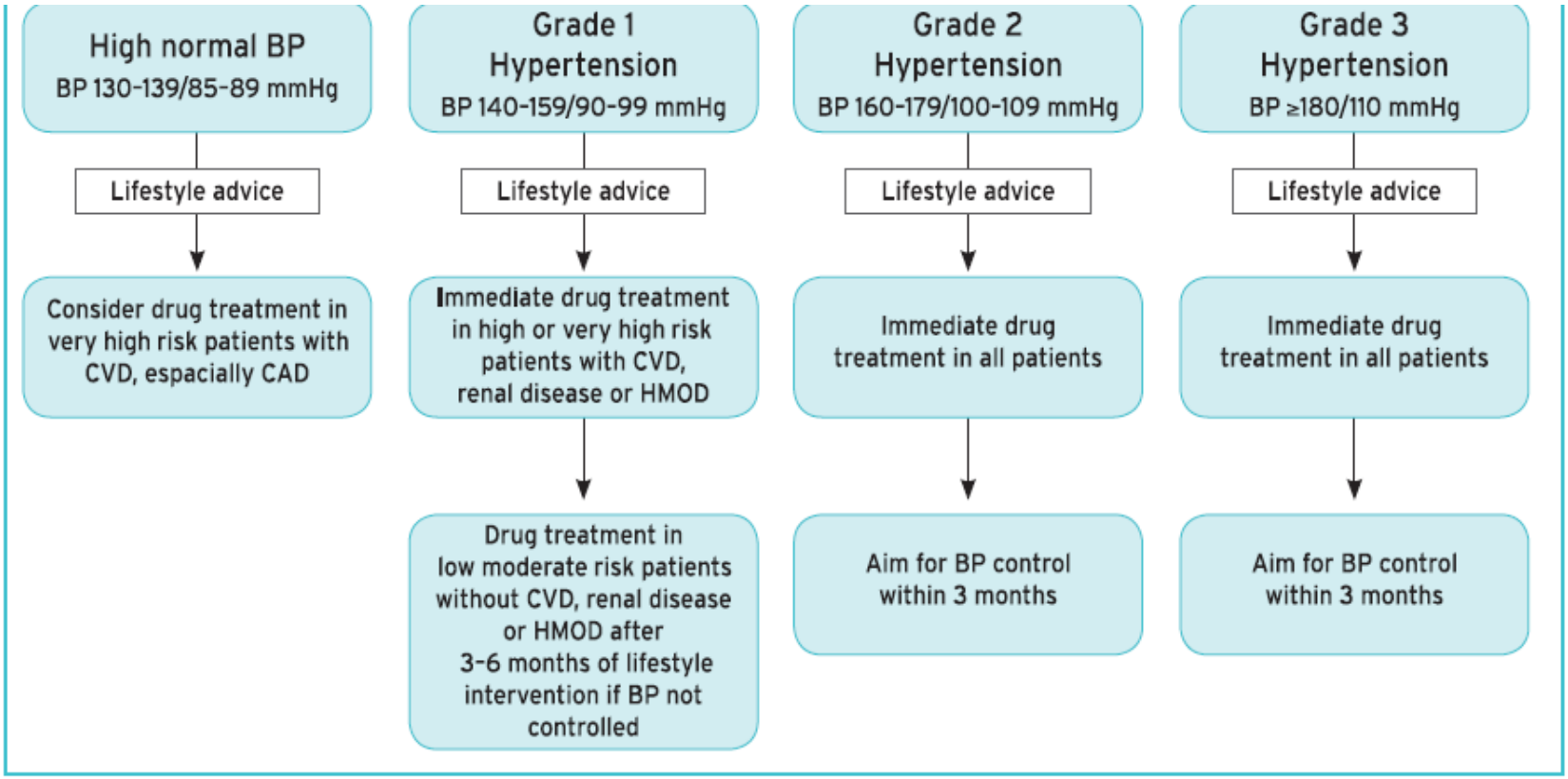

Figure 3 Initiation of blood pressure-lowering treatment (lifestyle changes and medication) at different initial office blood pressure levels. BP = blood pressure; CAD = coronary artery disease; CVD = cardiovascular disease; HMOD = hypertension-mediated organ damage.

Initiation of hypertension treatment according to office BP

Recommendations	Class[a]	Level[b]
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.[2,8]	I	A
In patients with grade 1 hypertension: • Lifestyle interventions are recommended to determine if this will normalize BP.[219]	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.[211,212]	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.[211,212]	I	A
In fit older patients with hypertension (even if aged >80 years), BP-lowering drug treatment and lifestyle intervention are recommended when SBP is ≥160 mmHg.[210,220,221]	I	A
BP-lowering drug treatment and lifestyle intervention are recommended for 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.[212]	I	A
Antihypertensive treatment may also be considered in frail older patients if tolerated.[215]	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.[213]	III	A
In patients with high–normal BP (130–139/85–89 mmHg): • Lifestyle changes are recommended.[17,35]	I	A
• Drug treatment may be considered when their CV is very high due to established CVD, especially CAD.[217]	IIb	A

Recommendations	Class[a]	Level[b]
Salt restriction to <5 g per day is recommended.[248,250,255,258]	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.[35]	I	A
It is recommended to avoid binge drinking.	III	C
Increased consumption of vegetables, fresh fruits, fish, nuts, and unsaturated fatty acids (olive oil); low consumption of red meat; and consumption of low-fat dairy products are recommended.[262,265]	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), as is aiming at 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.[262,271,273,290]	I	A
Regular aerobic exercise (e.g. at least 30 min of moderate dynamic exercise on 5–7 days per week) is recommended.[262,278,279]	I	A
Smoking cessation, supportive care, and referral to smoking cessation programs are recommended.[286,288,291]	I	B

- Promjena životnih navika podrazumijeva:
- smanjenje unosa soli na manje od 5 g dnevno (prosječno u Hrvatskoj je dnevni unos soli 11.3 g)
- ograničenje unosa alkoholnih pića, tjedna preporuka je manje od 14 jedinica za muškarce i 8 jedinica za žene (jedna jedinica je 125 ml vina, 250 ml piva), izbjegavanje pijančevanja
- povećana konzumacija povrća, svježeg voća, ribe, orašastih plodova, nezasićenih masnih kiselina (maslinovo ulje) te smanjena konzumacija crvenog mesa i zasićenih masnih kiselina (mediteranska dijeta)
- smanjenje tjelesne težine, izbjegavanje debljine i indeksa tjelesne mase (BMI) iznad 30 te opsega struka iznad 102 cm u muškaraca i 88 cm u žena; idealno bi bilo održavanje BMI-a 20 - 25 kg/m2, te smanjenje opsega struka <94 cm za muškarce i <80 cm za žene
- redovita tjelesna aktivnost (30 minuta umjerene aerobne aktivnosti 5 - 7 puta tjedno)
- prestanak pušenja.

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U farmakološkom liječenju postoji 5 glavnih klasa antihipertenzivnih lijekova:

- **inhibitori angiotenzin konvertirajućeg enzima (ACE inhibitori),**
- **antagonisti angiotenzinskih receptora (ARB),**
- **diuretici,**
- **blokatori kalcijskih kanala i**
- **beta blokatori.**

- Beta blokatori se ne savjetuju kao prva crta liječenja kod pacijenata starijih od 60 godina te kod plućnih bolesnika.

- Alfa blokatori nisu prva linija liječenja osim kod muškaraca koji imaju BPH.

- Kod mlađih bolesnika liječenje može započeti s ACE inhibitorom, kod starijih od 55 godina s blokatorom kalcijskih kanala.

Drug	Contraindications	
	Compelling	Possible
Diuretics (thiazides/thiazide-like, e.g. chlorthalidone and indapamide)	• Gout	• Metabolic syndrome • Glucose intolerance • Pregnancy • Hypercalcaemia • Hypokalaemia
Beta-blockers	• Asthma • Any high-grade sinoatrial 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 sinoatrial or atrioventricular block • Severe LV dysfunction (LV ejection fraction <40%) • Bradycardia (heart rate <60 beats per min)	• Constipation
ACE inhibitors	• Pregnancy • Previous angioneurotic oedema • Hyperkalaemia (potassium >5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception
ARBs	• Pregnancy • Hyperkalaemia (potassium >5.5 mmol/L) • Bilateral renal artery stenosis	• Women of child-bearing potential without reliable contraception

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; HFrEF = heart failure with reduced ejection fraction; LV = left ventricular.

Kombinacije lijekova

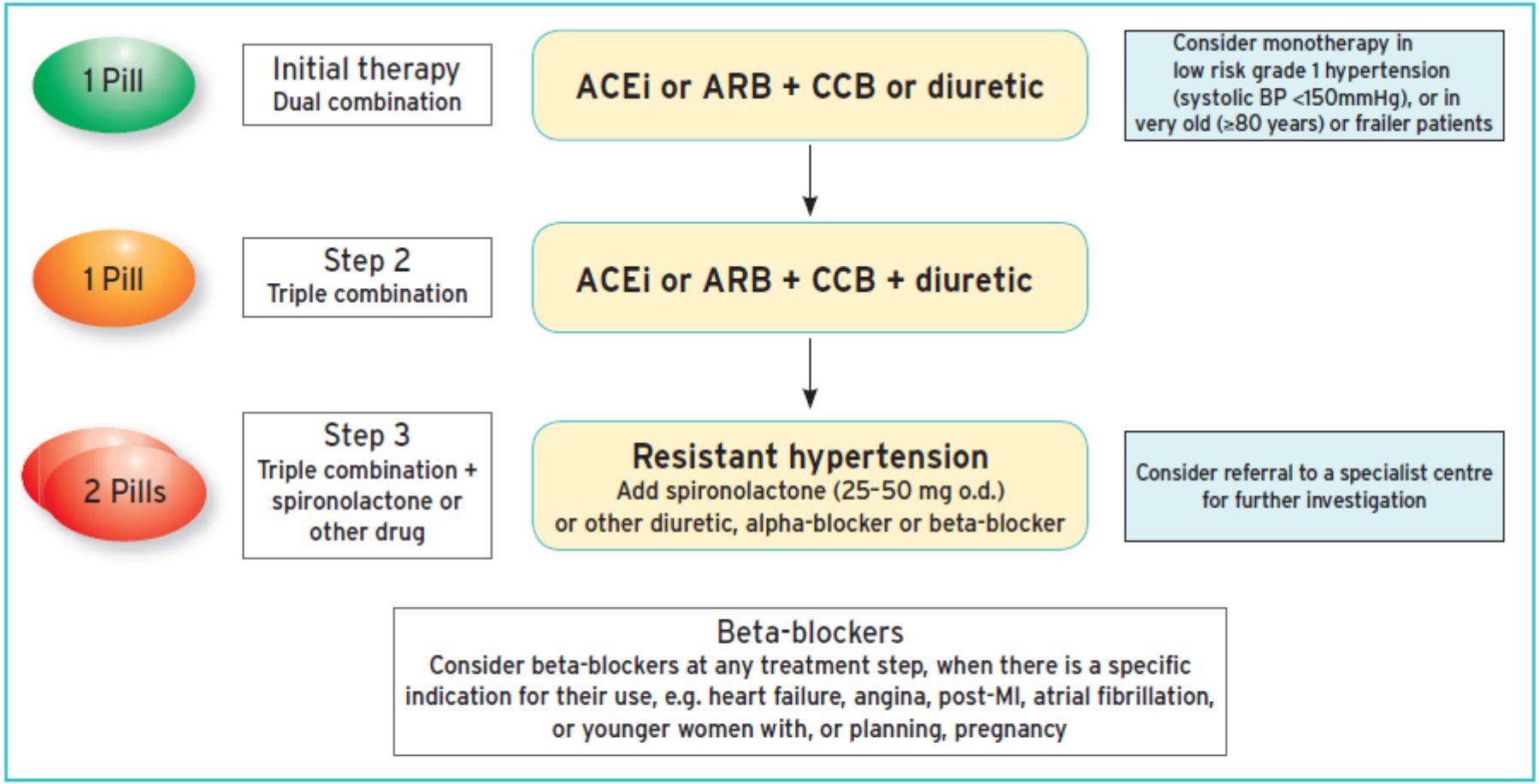

Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

- Prema najnovijim europskim smjernicama farmakološku terapiju treba započeti kod bolesnika s drugim i trećim stupnjem hipertenzije te kod onih s prvim stupnjem ukoliko postoji oštećenje ciljnih organa ili visoki kardiovaskularni rizik.
- Preporučuje se započeti terapiju kombinacijom dvaju lijekova i to s jednom tabletom koja sadrži dva lijeka. Iznimku čine stariji bolesnici i oni s prvim stupnjem hipertenzije i niskim rizikom kod kojih se terapija započinje jednim lijekom. Najpoželjnije kombinacije jesu ACE inhibitori ili ARB-i u kombinaciji s blokatorima kalcijskih kanala ili diureticima.
- Ako nije postignuta zadovoljavajuća kontrola arterijskog tlaka, preporuča se dodati i treći lijek (tipično kombinacija ACE inhibitora ili ARB-a, diuretika i blokatora kalcijskih kanala). Kod rezistentne hipertenzije se spomenutoj trojnoj terapiji dodaje i spironolakton ili ako ga se ne tolerira dodaje se beta ili alfa blokator.
- Ukoliko postoji indikacija za uzimanjem beta blokatora (koronarna bolest, popuštanje srca, potreba za antiaritmijskom terapijom), preporuča se početna kombinacija beta blokatora s nekim drugim iz skupine glavnih antihipertenziva. Kombinacija ACE inhibitora i ARB-a nije preporučljiva.

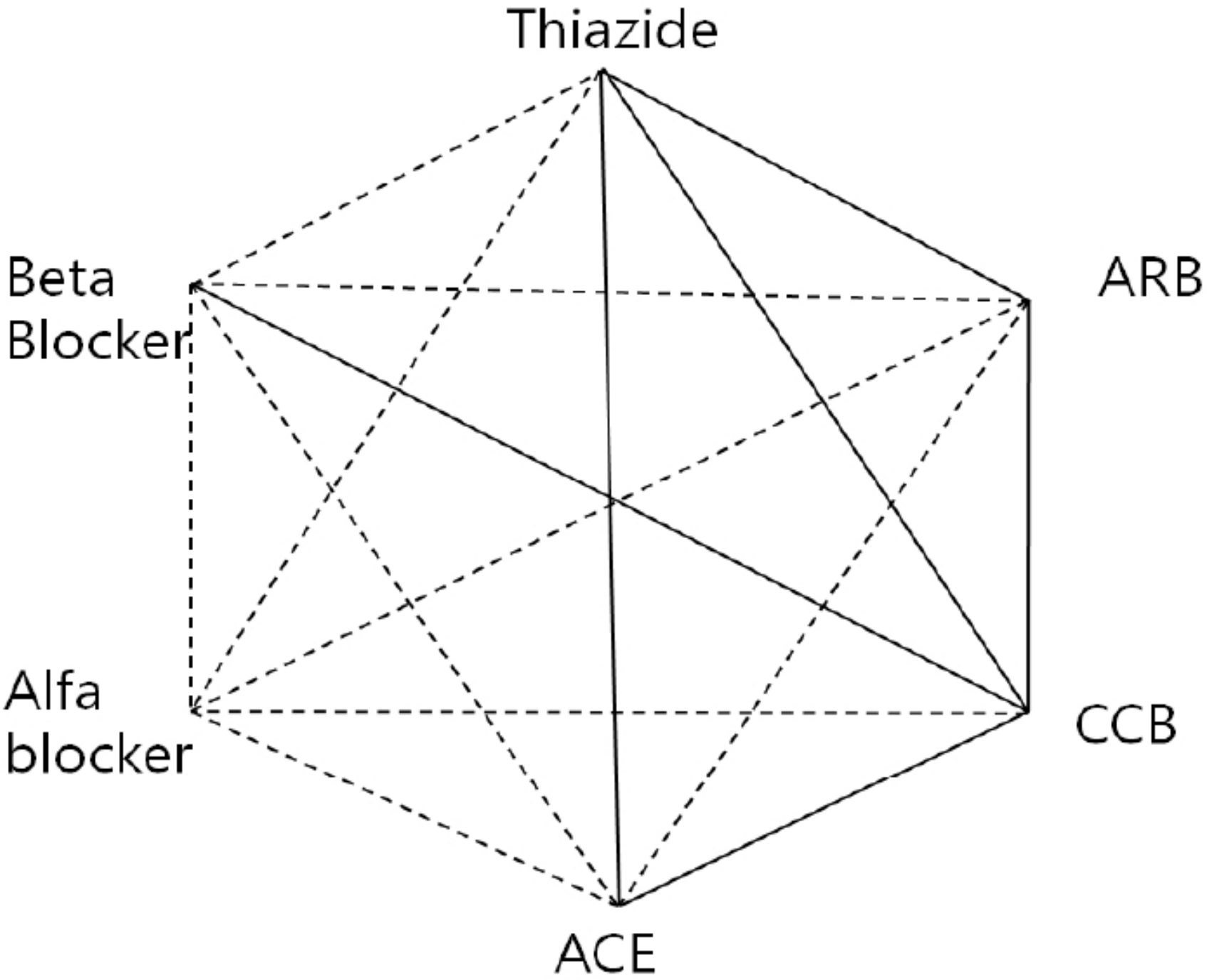
Thiazide
Beta Blocker
ARB
Alfa blocker
CCB
ACE

Table 28 **Medications and other substances that may increase blood presssure**[397]

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 and 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, and herbal remedies (e.g. ephedra and ma huang)

BP = blood pressure; VEGF = vascular endothelial growth factor.

HIPERTENZIVNA KRIZA- teška hipertenzija sa znakovima HMOD-a.

- **Hipertenzivna emergencija** zahtijeva hitno snižavanje tlaka parenteralnom primjenom lijekova u roku od nekoliko sati (TA ≥ 210/130 mmHg).
- **Hipertenzivna urgencija** je povećanje TA bez teških simptoma ili oštećenja ciljnih organa. TA potrebno spustiti postupno u roku 24-48h, peroralnom primjenom lijekova.

Table 31 Hypertensive emergencies requiring immediate blood pressure lowering with intravenous drug therapy

Clinical presentation	Timeline 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	Immediately 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 sulfate	Consider delivery

Recommendations	Class[a]	Level[b]
In women with gestational hypertension, 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 mmHg 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.[447,448]	I	B (methyldopa)
	I	C (labetalol or CCBs)
ACE inhibitors, ARBs, or direct renin inhibitors are not recommended during pregnancy.	III	C
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, 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.[453]	I	B
It is recommended to expedite delivery in pre-eclampsia with adverse conditions, such as visual disturbances or haemostatic disorders.	I	C