

2.5.

Arterial Hypertension

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EDUCATIONAL OBJECTIVES:

- an opportunistic approach
- care of the patient with hypertension
- cooperation with the patient
- a clinical method of work
- comorbidity

INTRODUCTION

Increased blood pressure is the main independent risk factor for cardiovascular diseases. Arterial hypertension is a chronically increased blood pressure which is at 140/90 mmHg, or higher in several consecutive measurements.

A high blood pressure is most often diagnosed in middle age. The prevalence of hypertension increases with age. Due to a large number of patients with arterial hypertension, who typically have additional risk factors for cardiovascular diseases, a holistic, patient-centred approach is necessary. The majority of these patients are assessed and treated by family physicians.

CAUSES, PREVALENCE AND IMPORTANCE OF ARTERIAL HYPERTENSION

Causes of arterial hypertension

The cause of this disease is unknown in more than 90% of patients with arterial hypertension. Therefore, we are talking about essential arterial hypertension, which is a multifactorial health condition. A disrupted relationship between the minute volume and the peripheral resistance can be the consequence of a series of inherited and environmentally determined factors.

EXAMPLE

A forty-three-year-old businessman comes to his physician's office because during his holiday in a health resort, his pressure was 170/100 mmHg and he was advised to visit his family physician. The patient does not feel any problems and has not visited his physician for eight years.

The most important environmental factors are an increased intake of salt and oversensitivity to table salt, but also other habits, like an excessive consumption of food, physical inactivity, smoking, alcoholism and a high level of psychological tension. The mechanism of inheritance is not well known.

We talk about so called secondary arterial hypertension in less than 10% of patients, when it is a consequence of kidney or adrenal gland diseases, endocrine diseases (thyroid gland diseases), diseases leading to increased blood viscosity or those which are a consequence of taking certain medicines (e.g. corticosteroids). In these cases it is possible to proceed causally, although the causes of increased blood pressure are often recognised only when the patient already suffers from permanently harmed body organs. Eliminating the cause does not enable the blood pressure to normalise any more.

Prevalence

The total prevalence of arterial hypertension is 30 to 40% of the general population and varies in various countries of the world. An increase of the number of patients suffering from arterial

hypertension will be the consequence of a rapid urbanisation in developing countries and two thirds of the world population suffering from arterial hypertension are anticipated to be living in these countries. The prevalence of arterial hypertension in Europe is around 40% (from 37 to 55% depending on the country) and it is higher than in the USA and in Canada. ~~The results of the study of arterial hypertension in Croatia (EH-UH), show the prevalence of arterial hypertension of 37.5%.~~ The prevalence of arterial hypertension increases with age. In the age group above 65, three out of four persons suffer from arterial hypertension. It is more prevalent in men before their fifth decade, and after that age it is more prevalent in women.

Importance of arterial hypertension

Arterial hypertension is typically an asymptomatic disease and we detect it when the patient comes to the physician's office for another reason, or for a preventive check up. Symptoms indicating increased blood pressure, like a headache, dizziness or sight problems, are not characteristic and they often occur in other diseases, but they can be signs that target organs are damaged.

Diagnostic procedure

The general recommendation is that every individual should know how high his/her blood pressure is. Since difficulties due to increased blood pressure are mostly not prominent, it is good to take every patient's blood pressure once in two years, and for those above 40, the interval should be once a year.

All adults should have their BP recorded in their medical record and be aware of their BP, and further screening should be undertaken at regular intervals with the frequency dependent on the BP level. For healthy people with an optimal office BP (<120/80 mmHg), BP should be remeasured at least every 5 years and more frequently when opportunities arise. In patients with a normal BP (120–129/80–84), BP should be remeasured at least every 3 years. Patients with high-normal BP (130–139/85–89 mmHg) should have their BP recorded annually because of the high rates of progression of high-normal BP to hypertension. This is true also for people in whom masked hypertension is detected.

~~If it is increased, we will schedule that the patient comes again so his/her blood pressure is measured. If case of a persistently increased blood pressure, which is diagnosed by at least two measurements during minimally two visits, we should conduct tests to assess the level of blood pressure and the cardiovascular risk. In case of a very high blood pressure, one examination is sufficient.~~

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.

Or

- Out-of-office BP measurement with ABPM and/or HBPM, provided that these measurements are logistically and economically feasible.

The diagnostic procedure includes:

- a repeated measurement of blood pressure,
- family and personal history,
- a clinical examination,
- laboratory and other tests.

Blood pressure measurement

~~According to the standard protocol, blood pressure is measured two times in a row, within 2 minutes and the mean of the two readings is taken into account.~~

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

- Further BP recording is indicated, at least every 5 years if BP remains optimal.
- Further BP recording is indicated, at least every 3 years if BP remains normal.
- If BP remains high-normal, further BP recording, at least annually, is recommended
- 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.

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. 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.

When using auscultatory methods, use phase I and V (sudden reduction/disappearance) Korotkoff sounds to identify SBP and DBP, 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.

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. 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. 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.

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

Record heart rate and use pulse palpation to exclude arrhythmia. It is recommended that all hypertensive patients undergo pulse palpation at rest to determine heart rate and search for arrhythmias such as AF

The blood pressure measurement is advised in physicians' offices for the screening and diagnosing of arterial hypertension. Moreover, a self-measurement is useful, and sometimes essential, as well as a continuous measurement of arterial blood pressure.

Home BP is the average of all BP readings performed with a semiautomatic, validated BP monitor, for at least 3 days and preferably for 6–7 consecutive days before each clinic visit, with readings in the morning and the evening, taken in a quiet room after 5 min of rest, with the patient seated with their back and arm supported. Two measurements should be taken at each measurement session, performed 1–2 min apart

Sometimes a 24-hour non-invasive blood pressure measurement is helpful. It collects the most objective data about the levels of blood pressure and oscillations during a day and night and offers the best correlation with the organ damage resulting from arterial hypertension.

BP is elevated in the office, but is normal when measured by ABPM, HBPM, or both. Conversely, 'masked hypertension' refers to untreated patients in whom the BP is normal in the office, but is elevated when measured by HBPM or ABPM

Family and personal history

Family history has to be detailed, focused on the presence of hypertension, diabetes, dyslipidaemia and early cardiovascular diseases in the family (ischaemic heart disease, stroke, peripheral blood vessels or kidney disease).

Table 12 Key information to be collected in personal and family medical history

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
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, 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)
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, or 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
Antihypertensive Drug Treatment
Current/past antihypertensive medication including effectiveness and intolerance to previous medications
Adherence to therapy

AF = atrial fibrillation; BP = blood pressure; CKD = chronic kidney disease; CVD = cardiovascular disease; HMOD = hypertension-mediated organ damage; TIA = transient ischaemic attack.

Personal clinical history needs to contain data about the duration and readings of the high blood pressure and the symptoms indicating secondary arterial hypertension. It also has to include data about medicines which may elevate blood pressure, life habits, the symptoms of coronary disease, cerebrovascular or peripheral blood vessels diseases, heart failure and other diseases which may affect the treatment of hypertension (asthma, alcohol dependence, anxiety and depressive disorders). It is advisable to check on the social environment and family relationships which could affect blood pressure. Assessment of the total cardiovascular risk applying the SCORE table needs to be done for every patient with arterial hypertension without cardiovascular disease or diabetes.

Clinical examination

Except measuring the blood pressure, we have to measure the heart rate and perform heart auscultation, listen for heart murmurs and sounds and evaluate the quality of tones. It is necessary to perform the carotid and renal arteries auscultation. Besides auscultation, kidney palpation (polycystic kidney) is also important. Finally, it is necessary to assess the peripheral blood vessels and oedema, perform an orientational neurological examination, if there is a suspicion of a cerebrovascular insult. Fundoscopic examination for hypertensive retinopathy. The clinical examination needs to be targeted on searching for additional risk factors. Therefore, it is necessary to measure the height and weight of the patient and calculate the body mass index, as well as to measure the waist circumference. The clinical examination has to search for signs indicating possible secondary hypertension: (~~characteristic cushingoid look, sounds which we hear by auscultation above the kidney arteries~~). 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

Laboratory and other tests

Laboratory tests are meant to check additional risk factors, possibility of secondary hypertension, an existence or a non-existence of organ damage.

Routine tests which have to be done in every newly discovered patient with arterial hypertension, later being the part of a permanent follow up of the patient with hypertension, are:

- haemoglobin and/or haematocrit
- fasting glucose in the blood and glycated HbA1c
- lipids in the serum: total cholesterol, LDL, HDL, triglycerides,
- potassium and sodium in the serum
- uric acid
- urea
- creatinine
- calculation of the glomerular filtration with the MDRD formula*
 - Blood liver function tests
- Urine analysis: microscopic examination; urinary protein by dipstick test or, ideally, albumin:creatinine ratio
- ~~microalbuminuria (in Croatia it is now possible in the clinical laboratory and it, unfortunately, often has to be skipped)~~
- electrocardiography (proving a possible hypertrophy of the left chamber, ischaemia and arrhythmia)

In deciding on further tests, it is important to be guided by those pathological results which have already been found.

**MDRD – Modification of Diet in Renal Disease is one version of the formula which uses the patient's serum creatinine, age, sex and race. $[(GF (ml/min/1.73) = 186 \times (\text{creatinine in the serum in mg/dl})^{-1.154} \times (\text{age in years})^{-0.203} \times (0.742 \text{ for women})]$. The result can easily be calculated by computer. However, most laboratories provide the result already calculated.*

Recommended tests

- the ankle brachial index,
- 24-hour proteinuria (if proteins were found in urine),
- glycated haemoglobin (HgbA1C),
- an examination of the fundus (in patients with severe arterial hypertension – a blood pressure 180/110 mmHg or higher; advanced changes in the fundus, like a haemorrhage indicate an increased cardiovascular risk),
- echocardiography (if hypertrophy or some other pathological findings were indicated by ECG),
- HOLTER-ECG in case of recorded arrhythmia,
- ultrasound of the carotid arteries (in cases with bruit above the carotids)
- ultrasound of the peripheral and abdominal arteries,
- proteinuria quantitatively (if the test strip is positive),
- a 24-hour measurement of arterial pressure and
- pulse wave velocity – an early indicator of blood vessels stiffness. In clinical practice, its availability is still limited.

Assessment of the total cardiovascular risk

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.

The SCORE system estimates the 10 year risk of a first fatal atherosclerotic event, in relation to age, sex, smoking habits, total cholesterol level, and SBP. The SCORE system also allows calibration for different CV risk levels across numerous European countries and has been externally validated. The SCORE system only estimates the risk of fatal CV events.

The risk of total CV events (fatal and non-fatal) is approximately three times higher than the rate of fatal CV events in men and four times higher in women. This multiplier is attenuated to less than three times in older people in whom a first event is more likely to be fatal.

Based on the level of blood pressure, the cardiovascular risk is classified in three categories: I (140-159/90 to 99 mmHg); II (160 to 179/100 to 109 mmHg) and III (>180/>110 mmHg) and additional risk factors, subclinical organs damage, diabetes, metabolic syndrome or existing cardiovascular disease, it is necessary to assess the degree of risk (Table 2.5.1) for cardiovascular diseases which is the starting point for a further treatment of hypertension and comorbidities (e.g. dyslipidaemia) in each patient.

Consequently, the inclusion of HMOD assessment is important in patients with hypertension and helps identify high-risk or very high-risk hypertensive patients who may otherwise be misclassified as having a lower level of risk by the SCORE system. This is especially true for the presence of left ventricular hypertrophy (LVH), CKD with albuminuria or proteinuria, or arterial stiffening

Table 2.5.1. Cardiovascular risk according to the distribution of arterial hypertension and comorbidity

	BLOOD PRESSURE mmHg
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Additional risk factors, asymptomatic organ damage, comorbidity	Upper normal distribution of blood pressure 130-139/85-90	HYPERTENSION Category I, 140-159/90-99	HYPERTENSION Category II, 160-179/100-109	HYPERTENSION Category III, >180/>110
	risk			
No other risk factors		low	moderate	high
1 to 2 risk factors	low	moderate	moderate to high	high
>3 risk factors	low	moderate to high	high	high
Diabetes, asymptomatic organ damage, chronic kidney disease (stage 3)	moderate to high	high	high	high to very high
Cardiovascular disease, chronic kidney disease (stage 4), diabetes with organ damage	very high	very high	very high	very high

Additional risk factors:

- sex: male > 55, female > 65,
 - smoking,
 - glucose in the blood 5.6 to 6.9 (abnormal OGTT),
 - dyslipidaemia,
 - total cholesterol > 4.9 mmol/l or
 - LDL > 3 mmol/l, or
 - HDL
 - female (f) < 1,2mmol/l,
 - male (m) < 1 mmol/l

 - early cardiovascular disease in the family
 - f <65 years of age
 - m <55 years of age
 - waist circumference
 - m > 102 cm,
 - f > 88 cm
- Metabolic syndrome:*
- RR \geq 130/85 mmHg,
 - abdominal obesity,
 - low HDL < 1,0 mmol/l for men and < 1,2 mmol/l for women,
 - increased triglycerides > 1,7 mmol/l,
 - increased GUK > 5,6 mmol/l.

Diabetes:

- fasting glucose in the blood ≥ 7 mmol/l in most measurements
- postprandial glucose test > 11 mmol/l
- glycosylated haemoglobin $> 7\%$

Subclinical organ damage:

- the heart: ECG/echocardiogram: left chamber hypertrophy,
- the blood vessels: thick intima-media $\geq 0,9$ mm and/or plaques, ankle brachial index $< 0,9$,
- the kidneys: calculation of the glomerular filtration by formula MDRD (< 60 ml/min) and/or microalbuminuria (30 to 300 mg/24 hours).

Comorbid clinical conditions:

- cerebrovascular diseases (TIA, CVI, a brain haemorrhage),
- heart diseases (ischaemic heart disease, heart failure),
- kidney diseases (diabetic nephropathy, creatinine: m > 133 , f > 124 , computed glomerular filtration < 30 ml/min proteinuria > 300 mg/24 hours),
- blood vessels damage,
- serious changes in the fundus (a bilateral haemorrhage and exudates, papilloedema of the optic nerve)

Treatment

The aim of treatment is to reduce the cardiovascular risk as much as possible. This can be achieved by controlling blood pressure and other risk factors for cardiovascular diseases. ~~The target pressure is below 140/90 mmHg in all patients, except those suffering from diabetes with the target pressure below 140/85 mmHg. In patients above 65, and those above 80 who are in good physical and mental condition, who, besides advanced atherosclerosis, have an increasing systolic, and a decreasing diastolic blood pressure, reaching a systolic blood pressure of 150-140 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 receiving BP-lowering drugs, it is recommended that SBP should be lowered to a BP range of $120-129$ mmHg in most patients.

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
- Close monitoring of adverse effects is recommended.
- These BP targets are recommended for patients at any level of CV risk and in patients with and without established CVD

A DBP target of < 80 mmHg should be considered for all hypertensive patients, independent of the level of risk and comorbidities. **Life-style improvement.** A life-style improvement by acquiring healthy life habits is the basic step for all patients with arterial hypertension. In mild hypertension we can reach normal blood pressure by a life-style improvement. On the other hand, even the optimal medication can not achieve that if there is no a life-style improvement. General measures of a life-style improvement are to:

- stop smoking,
- ~~reduce and stabilise body weight,~~ Body-weight control is indicated to avoid obesity (BMI > 30 kg/m² or waist circumference > 102 cm in men and > 88 cm in women), as is aiming at healthy BMI (about $20-25$ kg/m²) and waist circumference values (< 94 cm in men and < 80 cm in women) to reduce BP and CV risk
- ~~reduce alcohol consumption to, at most, 10 g of pure alcohol per day,~~ It is recommended to restrict alcohol consumption to less than 14 units per week for men and less than 8 units per week for women
- regularly aerobic exercise, at least 30 minutes a day for the most part of the week,
- reduce intake of table salt less than 5 g/day

- ~~introduce a diet with sufficient fruit and vegetables and reduce saturated and total fats.~~ 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

Treatments with medicines used to decrease blood pressure. It is necessary to introduce antihypertensive drugs in the treatment of arterial hypertension as soon as possible, as well as in the treatment of the patients with hypertension category II and III, and category I, if the total cardiovascular risk is high or very high (patients with diabetes, cardiovascular disease, chronic kidney disease, organ damage). We have more time at disposal regarding patients at a low or moderate risk and can wait for the effects of the life-style improvement (up to a few months) and only then introduce medication, if necessary.

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. 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. Antihypertensive treatment may also be considered in frail older patients if tolerated. 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.

In patients with high-normal BP (130–139/85–89 mmHg):

- Lifestyle changes are recommended
- Drug treatment may be considered when their CV is very high due to established CVD, especially CAD.

We can make a choice from the five groups of medicines:

- *diuretics* (hydrochlorothiazide, chlorhalidone, indapamide, torasemide, furosemide, spironolactone),
- *betablockers* (atenolol, bisoprolol, metoprolol, carvedilol, nebivolol),
- *angiotensin-converting-enzyme inhibitor* (cilazapril, enalapril, fosinopril, lisinopril, perindopril, ramipril,trandolapril),
- *angiotensin receptor blocker* (losartan, valsartan, telmisartan, eprosartan),
- *sodium channel antagonists* (verapamil, diltiazem, amlodipine, lacidipine, lercanidipine)

~~Treatment starts with a medicine from one of the above mentioned groups, or in combination of medicines from two groups, and with a fixed combination of medicines in patients with a high blood pressure or a high cardiovascular risk. Patient's characteristics, comorbidity, possible contraindications, and additional risk factors are taken into account in the choice of medication. Young patients are generally prescribed ACE inhibitors, while older patients are prescribed thiazide diuretics or sodium channel blockers. Angiotensin-converting-enzyme inhibitors are generally prescribed in cases of unacceptable side effects of ACE inhibitors, e.g. cough. In about two thirds of the patients, combined treatment has to be administered in order to reach the target blood pressure. A combination of two antihypertensive medicines from the RAS (renin-angiotensin system) group (ACE inhibitors, angiotensin receptor blocker and aliskiren) is not recommended. Other combinations according to patient characteristics are recommended.~~

Among all antihypertensive drugs, ACE inhibitors, ARBs, beta-blockers, CCBs, and diuretics (thiazides and thiazide-like drugs 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. 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

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).

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 with a CCB and a thiazide/thiazide-like diuretic, preferably as an SPC.

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.

The combination of two RAS blockers is not recommended.

Thiazide diuretics are contraindicated for the patients suffering from gout, and they are not recommended for those with an impaired glucose tolerance, those with metabolic syndrome and for pregnant women. Anti aldosterone diuretics are contraindicated in terminal kidney disease and hyperkalemia. Betablockers are absolutely contraindicated in 2 and 3 degree AV-block and in heart failure. ACE inhibitors are not prescribed for pregnant women, in cases of hyperkalemia, bilateral kidney arteries stenosis and angioneurotic oedema.

Absolute and relative contraindications to the use of different groups of antihypertensive drugs listed in tables 2.5.3

Table 2.5.3. Absolute and relative contraindications to the use of antihypertensive drugs

Drug	Contraindications	
	Compelling	Possible
Diuretics (thiazides/thiazide-like, e.g. chlorthalidone and indapamide)	<ul style="list-style-type: none"> ● Gout 	<ul style="list-style-type: none"> ● Metabolic syndrome ● Glucose intolerance ● Pregnancy ● Hypercalcaemia ● Hypokalaemia
Beta-blockers	<ul style="list-style-type: none"> ● Asthma ● Any high-grade sinoatrial or atrioventricular block ● Bradycardia (heart rate <60 beats per min) 	<ul style="list-style-type: none"> ● Metabolic syndrome ● Glucose intolerance ● Athletes and physically active patients
Calcium antagonists (dihydropyridines)		<ul style="list-style-type: none"> ● Tachyarrhythmia ● Heart failure (HFrEF, class III or IV) ● Pre-existing severe leg oedema
Calcium antagonists (verapamil, diltiazem)	<ul style="list-style-type: none"> ● Any high-grade sinoatrial or atrioventricular block ● Severe LV dysfunction (LV ejection fraction <40%) ● Bradycardia (heart rate <60 beats per min) 	<ul style="list-style-type: none"> ● Constipation
ACE inhibitors	<ul style="list-style-type: none"> ● Pregnancy ● Previous angioneurotic oedema ● Hyperkalaemia (potassium >5.5 mmol/L) ● Bilateral renal artery stenosis 	<ul style="list-style-type: none"> ● Women of child-bearing potential without reliable contraception
ARBs	<ul style="list-style-type: none"> ● Pregnancy ● Hyperkalaemia (potassium >5.5 mmol/L) ● Bilateral renal artery stenosis 	<ul style="list-style-type: none"> ● 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]

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 ACEinhibitor 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 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, c amiloride, c a higher dose thiazide/thiazide-like diuretic, or a loop diuretic;
- Or the addition of bisoprolol or doxazosin..

Can antihypertensive medications be reduced or stopped?

In some patients in whom treatment is accompanied by effective BP control for an extended period, it may be possible to reduce the number and/or dosage of drugs. This may particularly be the case if BP control is accompanied by healthy lifestyle changes such as weight loss, exercise habit, and a low-fat and low-salt diet, which remove environmental pressor influences. A reduction of medications should be made gradually, and the patient should be checked frequently because reappearance of hypertension can occur quickly, within weeks, or may take many months. Patients with prior HMOD or previous accelerated hypertension should not have their treatment withdrawn.

Medication treatment of other risk factors. Besides antihypertensive medicines, patients with arterial hypertension, who often have other risk factors for cardiovascular diseases (e.g. increased cholesterol or diabetes), or who suffer from cardiovascular disease, also need other medicines.

All patients suffering from cardiovascular disease and those with a high cardiovascular risk, including the patients with diabetes, have increased cholesterol and need hypolipemic treatment, typically with statins.

For patients at very high CV risk, statins are recommended to achieve LDL-C levels of <1.8 mmol/L, or a reduction of >_50% if the baseline LDL-C is 1.8–3.5 mmol/L

For patients at high CV risk, statins are recommended to achieve an LDL-C goal of <2.6 mmol/L or a reduction of >_50% if the baseline LDL-C is 2.6–5.2 mmol/L

For patients at low–moderate CV risk, statins should be considered to achieve an LDL-C value of <3.0 mmol/L

~~Antiaggregation treatment is necessary for all patients with arterial hypertension with already present cardiovascular disease and for the patients with an estimated high cardiovascular risk.~~

Antiplatelet therapy, in particular low-dose aspirin, is recommended for secondary prevention in hypertensive patients. Aspirin is not recommended for primary prevention in hypertensive patients without CVD. Before introducing antiaggregation treatment we have to lower the blood pressure to below 150/90 mmHg. Arterial hypertension is the most frequent risk factor for an onset of atrial fibrillation. Patients with atrial fibrillation with hypertension are at a double higher risk of a brain insult than patients with atrial fibrillation who have normal blood pressure. We decide to introduce anticoagulant treatment by balancing the risks of thromboembolic events and the dangers of a haemorrhage which may be caused by anticoagulant treatment. This treatment is introduced only after the blood pressure control has been achieved.

EXAMPLE

The patient informs the family physician that his father had high blood pressure and had a stroke at the age of 54. His mother died of diabetes and increased cholesterol. He has been smoking for 15 years, 20 cigarettes a day, eats irregularly, lacks time for recreation, but plays basketball with friends for one hour on Fridays. On the average, he has a bottle of beer in the evening and a few glasses of wine during the weekend and at business meetings.

The physician needs to anamnesticly check if the patient has symptoms of advanced atherosclerosis (e.g. stenocardia of effort).

At the examination, the family physician measures increased blood pressure in two consecutive measurements. It is 166/94 mmHg on his right, and 168/98 on his left arm. Controlling his cardiovascular status, the family physician has not found deviations from normal findings. The patient's body mass index is 31 and his waist circumference is 110 cm which indicates obesity of the abdominal type.

The physician has opted for laboratory tests and ECG, which is within normal values. The patient is advised to change his life-style and is scheduled for a follow up the following week. At the next visit, his blood pressure is 166/94 mmHg and the physician analyses the laboratory findings: glucose 6.2 mmol/l, total cholesterol 6.2, LDL 4.3, HDL 0.9, TG 2.3. Other laboratory findings are within normal values.

The patient has risk factors like obesity, smoking and increased cholesterol. Numerous risk factors taken into account, the total cardiovascular risk for this patient is high (above 10% in the following 10 years).

Based on his positive family history and a lack of data which would indicate secondary hypertension, essential hypertension is diagnosed.

The family physician emphasises the importance of a life-style change again (stopping smoking, reducing his intake of alcohol and salt, increasing his physical activity, reducing his body weight). One of the antihypertensive medicines is chosen, or the physician opts for a fixed combination of two medicines in lower doses which are taken once a day. The follow up examination is planned in one to three weeks.

COOPERATION WITH THE PATIENT

Adherence to treatment

Adherence to the treatment of arterial hypertension is defined as a level of patient adherence to doctor advice about the life-style, coming to scheduled visits to the family physician's office and taking medicines as prescribed. This is the function which includes patient's confidence in the physician, fear of the complications of hypertension and patient's decision to take control over his/her blood pressure. Patient adherence is estimated on the basis of his/her participation in the treatment with antihypertensive medicines. Treatment adherence declines mostly in the first six months after the treatment has started and continues declining in the following four years.

Patient non-adherence is a frequent challenge with negative consequences on patient's health and on the whole family. Literature data shows that only half of the patients regularly take antihypertensive medicines as prescribed. Important factors which affect patient adherence is the patient him/herself, the disease, treatment, and the environment where it takes place.

Factors to predict patient treatment adherence

Disease – arterial hypertension. Treatment adherence in chronic diseases improves when the patient understands them as more threatening and when diseases have symptoms which are alleviated by treatment. Arterial hypertension is a disease which typically does not cause difficulties, and it is the factor which affects treatment non-adherence.

Patient. There are two main causes for treatment non-adherence on the side of the patient: doubts about how useful the medication is and adverse effects of the medicine. The patient who knows why treatment is necessary and who has been treated with medicines which s/he tolerates well, will probably be more cooperative in the treatment than the patient who does not believe that treatment is necessary, who experiences adverse consequences and effects of the treatment, and who does not feel any benefits from the treatment.

Self-measuring of blood pressure increases patient's responsibility for the treatment success and it usually improves his/her treatment adherence and the control of blood pressure. This is why it is good to recommend to the majority of patients.

Treatment. The patient has to know about the purpose and objectives of treating arterial hypertension and accompanying conditions which affect the total cardiovascular risk. The mode of communication with the patient has to be adjusted to the patient's understanding of the disease (some are scared, others are unconcerned, and some accept it rationally), which depends on the personal, cultural and religious values of the patient and is a reflection of the environment in which the patient lives. In counselling the patient about improving his/her life-style, we have to set realistic goals (e.g. it would be realistic to set a goal of losing 5 kg, but not 30 kg for the patient with sick knees who is 30 kg overweight. For the patient who mostly eats in restaurants, it is difficult to follow the recommendation to reduce the intake of salt).

The choice of an antihypertensive medicine has to be adjusted to the patient in order to avoid the adverse effects of medicines, and to have a regime of taking the medicine which is as simple as possible and easily adjustable to the usual life rhythm. A better suited way of taking medicines, fewer prescribed pills and one dose per day, will greatly improve patient adherence.

Environment. Social support and informing the patients about the adverse effects of medication positively affect patient treatment adherence. On the contrary, depression and other psychosocial difficulties reduce patient adherence to antihypertensive treatment.

It is important that the patient's partner knows about the disease and treatment (e.g. if the partner prepares food, s/he has to know that food needs to be prepared with less salt, and that it should contain much fruit and vegetables).

EXAMPLE

Advise the patient about the goals of treatment and about the need for long-term medication of his increased blood pressure. During the control examination, check if the patient knows the purpose and goals of his increased blood pressure treatment and check for the possible adverse effects of antihypertensive medicines. Adjust treatment to the patient and encourage him/her to take medicines regularly. Use encouragement and praise to support the decision to change his/her life-style. Recommend him a self-measurement of blood pressure.

WORK ORGANISATION

Organisation of the management of patients with arterial hypertension

Care of the patient with arterial hypertension needs to follow the clinical methods of work. The practice nurse and the nurse practitioner assist the physician in the comprehensive and properly conducted long-time care of the patient.

All patients with arterial hypertension have to be included in the list – register of patients which is the basis for planning and implementing quality care of chronic patients. Parameters which need to be followed up and scheduled control examinations can be entered into the register.

Managing the patient in the family medicine office

When medication has been introduced, the patient is scheduled for a control examination within one to three weeks. That is an opportunity to identify possible adverse effects of the medication and patient adherence (life-style changes, taking medicines). The patient needs to be scheduled once a month until the normal values of blood pressure are stabilised. The patient is referred to the clinical specialist if his/her blood pressure is out of control six months after the treatment started, despite being treated with a combination of three medicines in optimal doses, one of them being a diuretic.

Further follow up after blood pressure has been regulated. Frequency of controls performed by physicians or practice nurses depends on the level of cardiovascular risk:

- a low or moderate risk: up to six months,
- a high or a very high risk: one to three months.

Blood pressure measurements in patient's home (self-measurement) can prolong the interval between the measurements in the office. Still, a patient with arterial hypertension should visit the

family physician's office at least once a year. The follow up of the blood pressure and hypertension regulation can be done by the nurse practitioner, in chronic disease counselling or during a necessary home visit.

Further care when blood pressure is not regulated. In cases when blood pressure is not regulated the patient should be scheduled for controls once a month. Causes why it is not regulated need to be explored and these causes should be eliminated. The most frequent causes of unregulated blood pressure are:

- patient treatment non-adherence (nonpharmacological and/or pharmacological),
- overlooked secondary arterial hypertension,
- hypervolemia in cases of too small doses of diuretics,
- the use of medicines which increase blood pressure (corticosteroids, nonsteroid anti inflammatory medicines, cocaine...).

By far the most frequent cause of unregulated blood pressure is the patient treatment non-adherence. The most important reasons for treatment non-adherence are adverse effects of medication. Comorbid diseases, mental disorders, chronic stress, and especially depressive disorders can be the causes of an inadequate regulation of blood pressure.

EXAMPLE

The patient is scheduled for controls more often (e.g. once a month) before his/her blood pressure shows normal values and before life habits are changed, and once in three to six months after that. Blood pressure, cardiac action and the occurrence of possible unwanted effects of medicines or new problems are checked at every examination. Possible life-style changes and treatment adherence are also checked. ~~Patients with regulated blood pressure can be controlled by the community nurse* who runs counselling for chronic diseases. This nurse can additionally counsel the patient about life style changes.~~

During annual follow ups, it is necessary to conduct a more extensive clinical examination which includes necessary laboratory tests. The total cardiovascular risk needs to be re-assessed and possible additional risk factors need to be controlled by introducing additional medication

*~~*In Slovenia a nurse practitioner, or a practice nurse counsels the patient about improvements in his/her life style and actively questions about adverse effects of medicines and about obstacles to treatment adherence. S/he encourages the patient to take responsibility for his/her own health care. The nurse practitioner can take over from the family physician the follow up examinations of the patients with regulated blood pressure. Managing the patients, s/he follows the algorithm of patient care. Involving the nurse who follows the algorithm of care can improve the control of blood pressure.~~*

Blood pressure is measured, pulse is assessed, and possible adverse effects of medicines and treatment adherence are checked at each patient's visit to the office. We check for the occurrence of symptoms which may indicate hypertension complications.

Once a year, besides the procedures included in every examination, we can conduct a more detailed examination, including a thorough clinical examination, laboratory and other tests, in order to recognise possible additional risk factors and to assess the total cardiovascular risk.

DECIDING ON APPROACHES TO TREATMENT

Most patients with arterial hypertension can be cared of by the family physician and his/her team. In most cases the cause of unsuccessful treatment is patient non-adherence which is a reflection of many aforementioned factors. In case of unsuccessful treatment, after non-adherence has been excluded, the physician has to explore other possible reasons and try to eliminate them.

The physician has to refer the patient to the clinical specialist in all cases considered an emergency (e.g. hypertensive encephalopathy), in cases of anticipated dangerous course of the

disease (e.g. a sudden exacerbation of chronic kidney disease), in cases when additional tests or interventions are necessary (a cardiac stress test in suspected ischaemic heart disease), in unclear conditions (suspected secondary arterial hypertension).

Referral to the clinical specialist

Referrals to specialists are divided into emergency and appointed. Appointed referrals should be realised relatively fast (within three months).

Appointed referrals. The patient with arterial hypertension is referred for an appointed (not urgent) examination to the specialist in the following cases:

- when a more detailed assessment of an organ damage is required (e.g. diagnosing the hypertrophy of the left chamber by echocardiography, assessment of the degree of atherosclerosis of the carotides),
- in cases of suspected secondary hypertension,
- in cases of resistant hypertension – when we do not succeed in adequately controlling blood pressure despite the antihypertensive treatment with a proper combination of three medicines in optimal doses and with positive patient treatment adherence,
- if hypertension complications occur, like e.g. chronic stable angina pectoris, peripheral arterial occlusive disease, atrial fibrillation, chronic heart failure, advanced chronic kidney disease, etc.

Emergency referrals. Reasons for emergency referrals are:

- malignant hypertension characterised by malignant changes in the fundus,
- cerebrovascular diseases: (hypertensive encephalopathy, a stroke, a subarachnoid haemorrhage, an intracerebral haemorrhage),
- heart and aorta diseases: aorta dissection, pulmonary oedema, acute coronary syndrome,
- kidney diseases: acute glomerulonephritis,
- a catecholamine release: pheochromocytoma, a drug interaction with MAO inhibiting drugs, hypertension as a consequence of a discontinued use of antihypertensive drugs.

EXAMPLE

The patient complains of chest pain after physical activity (woodchopping). The pain disappears after a few minutes.

The clinical status shows well controlled blood pressure (RR 132/78 mmHg and a sinus rhythm at the frequency of 66/min, without noise or signs of heart failure). Suspecting ischaemic heart disease, the ECG is done and the reading does not show signs of heart ischaemia at rest. Since the threshold of the occurrence of problems is relatively high, and in absence of an ECG shift, you opt for a routine referral to the clinical specialist.

The referral letter has to include all the important data about hypertension and comorbidities, previous treatment and tests. The reason for the referral has to be clearly stated, and the questions for which we need answers have to be clearly asked.

PREVENTION OF HYPERTENSION AND CARDIOVASCULAR DISEASES

Prevention and a healthy life-style. It is necessary to change certain life habits in order to prevent the occurrence of arterial hypertension or to enable its successful treatment:

- reduce weight. It is known that the increase in body mass increases blood pressure and then diabetes with arterial hypertension occurs;
- reduce the intake of sodium (salt). Besides lowering blood pressure, the reduced intake of salt also has other positive effect, like e.g. better action of antihypertensive drugs, reduction of the left chamber hypertrophy and reduction of proteinuria;
- change dietary habits according to the principles of healthy, balanced nutrition;

- ~~reduce the consumption of alcohol to 10g/day.~~ restrict alcohol consumption to less than 14 units per week for men and less than 8 units per week for women. In such daily doses, alcohol, especially in wine, correlates with a lower prevalence of coronary disease, stroke and peripheral blood vessels diseases. A daily consumption of larger quantities of alcohol increases blood pressure and correlates with a higher morbidity and mortality due to cardiovascular diseases;

- increase the physical activity. A regular physical activity for at least 30 minutes a day reduces blood pressure and partly reduces the incidence of hypertension and diabetes, due to its prevention of obesity;

- stop smoking. Arterial hypertension is more difficult to control in smokers, because smoking causes an acute increase of blood pressure. Severe forms of arterial hypertension and secondary renovascular arterial hypertension which is a reflection of advanced atherosclerosis occurring earlier, are more frequent in smokers.

Managing the patient with hypertension and comorbidities. In 90% of patients with arterial hypertension, there are also other risk factors for cardiovascular disease (e.g. in case of obesity, an onset of diabetes, or a depression after stroke – complicated comorbidity). One third of patients with hypertension has at least one complication of arterial hypertension (e.g. stroke – causal comorbidity). Patients with arterial hypertension also have other chronic health conditions, which are not related to hypertension (e.g. hip problems – accidental comorbidity).

Hypertension is most often accompanied by increased body weight or obesity, increased cholesterol and diabetes. Patients with arterial hypertension, besides comorbidities, often have additional mental disorders, like e.g. a depressive disorder, which unfavourably impacts on the results of arterial hypertension treatment. Patients with arterial hypertension and comorbidities need to be cared of comprehensively. It means that, parallel with arterial hypertension, we need to take into account additional risk factors and complications and treatments of other physical or mental illness or disorders in order to provide a better treatment outcome.

~~Patients with coronary heart disease require the administration of betablockers, and patients suffering from diabetes require ACE inhibitors/ARB and CCB. Hypertensive patients with obstructive pulmonary disease are treated primarily with diuretics and sodium channel blockers.~~

In people with diabetes receiving BP-lowering drugs it is recommended:

- To target SBP to 130 mmHg and <130mmHg if tolerated, but not <120 mmHg.
- In older people (aged >_65 years aged), to target to an SBP range of 130–139 mmHg.
- To target the DBP to <80 mmHg, but not <70 mmHg.

It is recommended to initiate treatment with a combination of a RAS blocker with a CCB or thiazide/thiazide-like diuretic

In patients with diabetic or non-diabetic CKD:

- It is recommended to lower SBP to a range of 130–139 mmHg. Impact on renal function and electrolyte should be controlled. 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. A combination of a RAS blocker with a CCB or a diuretic is recommended as initial therapy

In all patients with LVH:

- It is recommended to treat with an RAS blocker in combination with a CCB or diuretic. SBP should be lowered to a range of 120–130 mmHg.

In patients with CAD receiving BP-lowering drugs, it is recommended:

- To target SBP to <_ 130 mmHg if tolerated, but not <120 mmHg. In older patients (aged >_65 years), to target to an SBP range of 130–140 mmHg.
- To target DBP to <80 mmHg, but not <70 mmHg.

In hypertensive patients with a history of myocardial infarction, beta-blockers and RAS blockers are recommended as part of treatment. In patients with symptomatic angina, betablockers and/or CCBs are recommended.

In patients with AF, screening for hypertension is recommended. A beta-blocker or non-dihydropyridine CCB should be considered as part of the treatment of hypertension if rate control is needed. Stroke prevention with oral anticoagulation is recommended in patients with AF and hypertension, and a CHA2DS2-VASc score of ≥ 2 in men and ≥ 3 in women. Stroke prevention with oral anticoagulants should be considered in AF patients with hypertension, even when hypertension is the single additional risk factor (CHA2DS2-VASc score of 1). Oral anticoagulants should be used with caution in patients with marked BP elevation (SBP ≥ 180 mmHg and/or DBP ≥ 100 mmHg); 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

In hypertensive patients with heart failure (with reduced or preserved ejection fraction), BP-lowering treatment should be considered if BP is $\geq 140/90$ mmHg. 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 MRA if required. Dihydropyridine CCBs may be added if BP control is not achieved. In patients with HFpEF, BP treatment threshold and target values should be the same as for HFrEF. Because no specific drug has proven its superiority, all major agents can be used. It is unclear how low BP should be lowered in patients with heart failure. It may be wise to avoid actively lowering BP to $<120/70$ mmHg. However, some patients may achieve even lower BP levels than this because of the desirability to remain on treatment with guideline-directed heart failure medications, which, if tolerated, should be continued because of their protective effect.

In acute ischaemic stroke, routine BP lowering with antihypertensive therapy is not recommended, with the exceptions: in patients with acute ischaemic stroke who are eligible for i.v. thrombolysis, BP should be carefully lowered and maintained at $<180/105$ mmHg for at least the first 24 h after thrombolysis. 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.

In hypertensive patients with an acute cerebrovascular event, antihypertensive treatment is recommended immediately for TIA and after several days in ischaemic stroke. In all hypertensive patients with ischaemic stroke or TIA, an SBP target range of 120–130 mmHg should be considered.

In patients with acute intracerebral haemorrhage immediate BP lowering is not recommended for patients with SBP <220 mmHg. In patients with SBP ≥ 220 mmHg, careful acute BP lowering with i.v. therapy to <180 mmHg should be considered. The recommended antihypertensive drug treatment strategy for stroke prevention is a RAS blocker plus a CCB or a thiazidelike diuretic

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

EXAMPLE

A patient with arterial hypertension has dyslipidaemia and is also obese. The stress test confirms one of the arterial hypertension complications – ischaemic heart disease. In fear of a heart infarction, the patient is in depression.

It is necessary to control all risk factors by changing the life-style and/or with medication, taking care of the coexisting depression in the patients with more risk factors and comorbidities

THE IMPORTANCE OF THE FAMILY AND THE ENVIRONMENT

The occurrence and course of hypertension is influenced by numerous factors which can be divided into hereditary determinants and environmental factors.

Hereditary determinants. The inheritance of hypertension is not clearly explained. However, we assume that approximately one third of blood pressure changes in a race and an individual is determined by genetic factors. The probability of arterial hypertension is high in patients with a family history of parents with hypertension and frequent strokes in the family, especially if these complications occurred before the age of sixty.

The importance of education and social status. Social status and education do not affect success in the blood pressure control. However, the presence of psychosocial problems is a factor which reduces the patient's cooperability in treatments with antihypertensive medicines and usually leads to poor treatment outcomes.

The importance of the family. The family response to one of its members disease is important in achieving the defined goals of treatment. The family may act overly protective and relate towards the patient with arterial hypertension as if s/he is disabled or, on the other hand, it can ignore the disease and prepare fatty and salty food, and watch TV with the patient instead of going for a walk.

RIGHTS FROM HEALTH, DISABILITY AND PENSION INSURANCE

Arterial hypertension can, during its long-term development through many years, lead to complications (e.g. a stroke, a heart infarction, a heart failure, a leg amputation due to peripheral arterial occlusive disease, a chronic kidney failure...), which require an assessment of the remaining work ability, of a need for assistance allowance and of a permanent disability.

Right to a sick-leave is the right from health insurance, and the right to disability and assistance allowances are rights from disability and pension insurance.

Rights from health insurance

Temporary work disability – sick-leave. The patient with arterial hypertension without complications and with a satisfactory blood pressure control is able to work.

The patient with severe arterial hypertension before its cause is cleared (blood pressure above 180/110 mmHg) and before blood pressure is sufficiently regulated, and the patient with acute complications of arterial hypertension (e.g. hypertensive encephalopathy, an acute myocardial infarction) are temporarily unable to work.

Referring the patient to rehabilitation. Patients with arterial hypertension with complications (a status after a myocardial infarction, a mechanical valve replacement, or stroke) where the treatment with comprehensive physiotherapy is an opportunity for a faster and better rehabilitation, an improved health status for a longer period of time, preventing the development or exacerbations and facilitating a faster return to the family or work environment have the right to a treatment in specialised institutions for rehabilitation, according to the health insurance rules.

EXAMPLE

The patient with hereditary determinants for hypertension and cardiovascular disease, living an unhealthy life-style, has hypertension. Neither the patient, nor his family take it seriously. He has not changed his life-style and repeatedly forgets to take his medicines. With the parallel presence of additional risk factors, this has led to ischaemic heart disease, which initially presented as angina pectoris in effort. One morning, the patient felt a strong pain behind his breastbone. The pain was similar, but stronger and longer than the pain he felt in effort. The doctor on duty, seeing the characteristic clinical history and ECG changes which indicate a cardiac infarction, performs emergency procedures and refers the patient to hospital, where the diagnosis with which he has been referred is confirmed.

On discharge, the patient is referred to a special rehabilitation institution. Because of heart failure and a reduced physical ability after a heart infarction, the patient is referred to the disability committee for the assessment of his remaining work ability.

Rights from pension and disability insurance

Permanent work disability. It is necessary to assess the remaining work ability for the job which the patient with hypertension complications was doing before the illness. A permanent work disability is possible after the treatment and rehabilitation have been completed and a significant improvement of the health status is not expected. Return to work greatly depends on the patient's motivation for work, the social conditions of the workplace (the relationship with the employer and co-workers) and creativity at work which makes it a challenge for self-affirmation.

~~**Assistance allowance.** If the patients with arterial hypertension with complications (e.g. after stroke), after the treatment and rehabilitation still needs assistance in most or all daily activities, like washing, dressing, feeding, mobility and other, and if s/he has rights ensuing from disability and pension insurance, the physician will inform and advice him/her about the procedure of getting the assistance allowance.~~

Disability allowance. Disability is a loss, a significant damage or disability of certain organs which reduces the quality of life. It is not important if this disability affects the patient's work ability. Patients with arterial hypertension, who have a more significant organ damage (e. g. kidney failure where dialysis is necessary, the amputation of the legs above the knees) have the right to a disability allowance.

KEY MESSAGES

Arterial hypertension is a public health problem, due to its prevalence and significance. Care of the patient with arterial hypertension with or without chronic comorbidity requires a long term holistic patient centred approach.

The purpose of treating the patient with arterial hypertension is to reduce his/her total cardiovascular risk, not only to control blood pressure.

A life-style improvement and acquisition of healthy life habits are necessary for all patients with arterial hypertension even when medicines against high blood pressure are necessary.

It is important to regulate blood pressure. The choice of medication depends on patient's characteristics and comorbidity.

The patient with arterial hypertension should be cared of in a holistic way so that we care of additional risk factors and complications parallel with the care of arterial hypertension. We need to simultaneously care of the treatment of some other somatic diseases or mental disorders which may affect the outcome of treatment.

The biggest challenge in the blood pressure regulation is poor patient adherence. With his/her adequate approach, the family physician can significantly impact on the improvement of patient adherence.

‘What to do’ in arterial hypertension

- It is recommended that BP be classified as optimal, normal, or high-normal, or grades 1–3 hypertension, according to office BP.
- All adults (>18 years) should have their office BP measured and recorded in their medical file, and be aware of their BP.
- 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.
- Out-of-office BP measurement with ABPM and/or HBPM, provided that these measurements are logistically and economically feasible.
- Lifestyle interventions: salt restriction to <5 g per day is recommended; restrict alcohol consumption to <14 units per week for men and <8 units per week for women; 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; Body weight control is indicated to avoid obesity (BMI >30 kg/m², or waist circumference >102 cm in men and >88 cm in women) and aim for healthy BMI (about 20–25 kg/m²) and waist circumference values (<94 cm in men and <80 cm in women) to reduce BP and CV risk; regular aerobic exercise (e.g. >30 min of moderate dynamic exercise on 5–7 days per week) is recommended; smoking cessation and supportive care and referral to smoking cessation programmes are recommended.
- 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 high risk due to established CVD, renal disease, or diabetes.
- In patients with high-normal BP (130–139/85–89 mmHg), lifestyle changes are recommended.
- 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.
- In patients with grade 1 hypertension at high risk or with evidence of HMOD, prompt initiation of drug treatment is recommended simultaneously with lifestyle interventions.
- Prompt initiation of BP-lowering drug treatment is recommended in patients with grade 2 or 3 hypertension at any level of CV risk, simultaneously with the initiation of lifestyle changes.
- 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.
- 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.
- 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 receiving BP-lowering drugs, it is recommended that SBP should be lowered to a BP range of 120–129 mmHg in most patients.
- 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.
- 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 to initiate antihypertensive treatment with a two-drug combination, preferably in an SPC.
- Frail older patients and those at low risk and with grade 1 hypertension (particularly if SBP is <150 mmHg) start from monotherapy
- 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 with a CCB and thiazide/thiazide-like diuretics, preferably as an SPC.

- 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.
- 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.

‘What not to do’ in arterial hypertension

- The combination of two RAS blockers is not recommended. III 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.
- Aspirin is not recommended for primary prevention in hypertensive patients without CVD.

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