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Current status of secondary prevention in Czech coronary patients in the EUROASPIRE V Study

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SOUHRN

Úvod: Sekundární kardiovaskulární (KV) prevence po prodělaném infarktu myokardu (IM) je neméně důležitá než léčba akutního IM. Lepší KV prevence může rozhodující měrou přispět k pokračování pozitivních trendů KV morbidity a mortality v České republice v posledních třech desetiletích.
Cíl: Stanovit, jak jsou do praxe implementována nedávná evropská doporučení pro sekundární prevenci ischemické choroby srdeční (ICHS) (2012).
Metodika: Konsekutivně a retrospektivně bylo vybráno 624 pacientů, mužů a žen ve věku ≤ 80 let, hospitalizovaných pro akutní koronární syndrom a/nebo chirurgickou či katetrizační koronární revaskularizaci. Byl proveden rozbor chorobopisů a následně byli ambulantně vyšetřeni respondenti, minimálně šest měsíců, maximálně dva roky po přijetí k hospitalizaci.
Výsledky: Celkem bylo vyšetřeno 406 respondentů. Z nich 20 % byli aktivní kuřáci, 44,8 % bylo obézních (BMI ≥ 30), v pásmu nadváhy a obezity (BMI ≥ 25) bylo 85,5 % respondentů, centrálně obézních (obvod pasu ≥ 102 cm u mužů, ≥ 88 cm u žen) 70,2 %, doporučované fyzické aktivity (30 minut 5× týdně) nedosáhlo 85 %. Krevní tlak zvýšený nad hodnoty požadované v doporučeních kardiovaskulární prevence z roku 2012 (≥ 140/90 mm Hg, u diabetiků ≥ 140/80 mm Hg) mělo 55,1 % pacientů, zvýšený LDL-cholesterol (≥ 1,8 mmol/l) 63,5 % pacientů. Diabetes (známý a nově diagnostikovaný) vykazovalo 41,2 % respondentů, prediabetes 23,4 %. Při použití glukózového tolerančního testu to bylo 44,7 %, respektive 32,3 %. V době našeho vyšetření bylo 88,4 % pacientů léčeno antiagregancii, 81,3 % beta-blokátorem, 78,8 % inhibitory angiotenzin konvertujícího enzymu (ACEI) nebo antagonistou receptoru ATII, 92,1 % statinem, 92,9 % prodělalo koronární revaskularizaci.
Závěr: Většina pacientů v sekundární prevenci ICHS má nezdravý životní styl – nezdravou dietu a nedostatečnou pohybovou aktivitu. Prevalence nadváhy, obezity a diabetu je velmi vysoká, prevalence obezity a centrální obezity se dále zvýšila. Farmakoterapie je v sekundární prevenci používána u většiny pacientů, ale doporučených hodnot krevního tlaku, lipidového a glycidového metabolismu je dosahováno jen u menšiny.

ABSTRACT

Introduction: Secondary prevention after myocardial infarction is at least as important as treatment of the acute phase. Improved cardiovascular (CV) prevention can decisively contribute to the continuation of positive trends of CV morbidity and mortality seen in the Czech Republic in last three decades.
Objectives: To determine, in patients with coronary heart disease (CHD), how the treatment goals as defined by the current European guidelines on CV secondary prevention (2012) are implemented in clinical practice.
Methods: Patients ≤ 80 years when hospitalized for acute coronary syndrome, and/or CABG or PCI were identified from hospital records and invited to outpatient clinical investigation (interview) not less than 6 months and not more than 2 years after hospital discharge. Data collection was performed based on a review of medical records and the interview.

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Results: Of 624 invited patients, 406 responders were interviewed. Among these, 20% were smokers, 44.8% were obese (BMI ≥ 30), 85.5% were overweight or obese (BMI ≥ 25), 70.2% had central obesity (waist circumference ≥ 102 cm in men, ≥ 88 cm in women), the recommended level of physical activity (30 minutes 5 times a week) was not attained by 85%. Raised blood pressure (≥ 140/90 mmHg, in diabetics ≥ 140/80 mmHg) was measured in 55.1%, elevated LDL-cholesterol (≥ 1.8 mmol/L) in 63.5% of responders. Manifest diabetes mellitus (known plus newly discovered at interview) was present in 41.2%, and prediabetes in 23.4% of patients. The respective figures when using the oral glucose tolerance test (OGTT) were 44.7% and 32.3%. At interview, 88.4% of patients were being treated with aspirin or other antiplatelet drugs, 81.3% with beta-blockers, 78.8% with ACE inhibitors or angiotensin receptor blockers (ARBs), 92.1% with statins, and 92.9% had undergone revascularization.

Conclusion: The majority of coronary patients have unhealthy lifestyles such as unhealthy diet and sedentary behavior. The prevalence of overweight, obesity, and diabetes is very high, and prevalence of obesity further increased. Although pharmacotherapy is used in the majority of patients, the recommended levels of blood pressure, lipid, and glucose metabolism are achieved in only a minority.

Keywords:
Cardiovascular risk factors
Coronary heart disease
EUROASPIRE-V
Guidelines
Secondary prevention

Introduction

Coronary heart disease (CHD) continues to be the leading cause of death in the Czech Republic and Europe alike. CHD mortality has been decreasing rapidly in the Czech Republic since 1990, but this decrease stopped in both sexes in 2010 and continued in women in 2014–2016 only.[1] Preventive lifestyle modifications (control of smoking, healthy diet, physical activity) together with effective control of hypertension, hyperlipidemia, and diabetes as well as other cardioprotective pharmacotherapy (antiplatelet agents, beta-blockers, angiotensin-converting enzyme [ACE] inhibitors and angiotensin receptor blockers [ARBs], lipid-lowering drugs), delay the first presentation of CHD as well as recurrent coronary events, thus significantly reducing CHD morbidity and mortality rates.[2]

Preventive management of patients with overt CHD was defined in detail by the European guidelines on cardiovascular disease prevention in clinical practice. The guidelines were first published in 1994, the fifth ones, including the treatment goals of the EUROASPIRE V study, in 2012.[3] Several Czech-language guidelines on the same issue have also been developed.

In order to assess "real-life" secondary prevention of CHD, implementation of and adherence to the guidelines, five cross-sectional EUROASPIRE (European Action on Secondary and Primary Prevention by Intervention to Reduce Events) surveys were performed: in 1995–1996, 1999–2000, 2006–2007, 2012–2013 and, finally, EUROASPIRE V covering the 2016–2017 period (EUROASPIRE I–V). Of the originally nine countries involved in the survey, the number of participating countries has grown to 27 with 131 centers in the present study. The Czech Republic, with its two study centers (Prague and Pilsen), has participated in all five surveys; results of the first four surveys were published showing both European and, separately, Czech data.[4–7]

Study population and methods

Survey design and patients

In the Czech Republic, this cross-sectional survey was conducted within the EUROASPIRE V study in two centers, namely in the Center for Cardiovascular Prevention, Charles University in Prague, First Faculty of Medicine and Thomayer Hospital, Prague, and at the 2nd Department of Medicine, Faculty of Medicine, Charles University and University Hospital in Pilsen. Both centers were participating in the previous surveys and are attached to hospitals providing all types of care to cardiac patients while catering to catchment areas with a population of at least half a million.

Using hospital discharge we identified, both retrospectively and consecutively, patients, men and women, aged ≥ 18 years and ≤ 80 years at the time of hospitalization for at least one of the following diagnoses: (1) elective or emergency coronary artery bypass surgery (CABG); (2) elective or emergency percutaneous coronary angioplasty; (3) acute myocardial infarction (STEMI or non-STEMI); and (4) acute myocardial ischemia. Eligible for inclusion were patients (first or re-)hospitalized not less than 6 months and not more than 2 years prior to the expected date of the study interview. Overall, 624 patients were selected and invited to attend a study visit. The interviews were held from September 2016 through June 2017.

Data collection

The survey was performed in compliance with the EUROASPIRE V study protocol, copying previous EUROASPIRE study protocols, described in detail elsewhere.[4–7] At interview, each respondent's history was taken including their personal and demographic characteristics, personal and family history of cardiovascular disease, data on adherence to principles of a healthy lifestyle, and pharmacotherapy. Standardized measurements were made as per protocol using calibrated devices, with blood sampling and patients completing the self-reported questionnaires in the respective validated national form. The following measurements were performed:

Height and weight in light-indoor clothes without shoes (SECA scales 701 and measuring stick model 220, SECA GmbH, Hamburg, Germany). Overweight was defined as a body mass index (BMI ≥ 25 to < 30 kg/m^2, obesity as BMI ≥ 30 kg/m^2).

Waist circumference was measured using a metal tape between the lowest rim of the rib cage and the superior iliac crest with the patient standing. Central obesity was defined as a waist circumference of ≥ 88 cm for women and ≥ 102 cm for men.

Blood pressure (BP) was measured by a physician twice after at least 10-minute rest in the sitting position on the right arm using an automatic digital sphygmomanometer Omron M6 (Omron, Healthcare Co Ltd, Hoofddorp, The Netherlands) with the mean value used for all analyses. Raised BP was defined as blood pressure ≥ 140/90 mmHg (≥ 140/80 mmHg in patients with diabetes mellitus).

Smoking at the time of interview was defined as self-reported smoking, and/or a breath carbon monoxide levels exceeding 10 ppm, measured by a Smokerlyzer (Model Micro + Bedfont Scientific, Upchurch, United Kingdom). Persistent smoking was defined as smoking at interview among patients reporting to be smokers in the month prior to the index event.

The physical activity target was defined by the answer to the question "Do you take regular physical activity of at least 30 minutes´ duration on average five times a week?"

Venous blood samples were obtained by venipuncture after at least 12-hour fasting. The serum separated from venous blood samples was analyzed in local laboratories (Thomayer Hospital, Prague 4 and Pilsen University Hospital) and also stored at –70 °C to be subsequently shipped (frozen) to the central laboratory at the Disease Risk Unit, National Institute for Health and Welfare, Helsinki, Finland. Serum total cholesterol (TC) was determined enzymatically, HDL-cholesterol (HDL) and triglycerides (TG) using kits manufactured by Abbott Laboratories (Architect c8000, Abbott Park, Illinois, USA), LDL-cholesterol (LDL-C) levels were calculated using Friedewald's formula if the triglyceride level was < 4.5 mmol/L.[8] Elevated LDL-C concentration was defined as ≥ 1.8 mmol/L. Glycated haemoglobin (HbA_{1c}) was measured in whole blood. Plasma glucose was analysed locally with a photometric point-of-care technique (HemoCue Glucose 201 RT, Ängelholm, Sweden).[9]

Our definition of known diabetes was self-reported diabetes. In patients without a history of diabetes and with fasting glucose ≤ 11 mmol/L, we performed the 2-hour oral glucose tolerance test (OGTT). Fasting glucose ≥ 7.0 mmol/L or 2-h OGTT glucose ≥ 11 mmol/L were defined as new-onset diabetes. Fasting glucose ≥ 6.1 and < 7 mmol/L and 2-h OGTT ≥ 7.8 and < 11 mmol/L were classified as prediabetes.

Standardized questionnaires, specifically HADS (Hospital Anxiety Depression Scale), were completed by each patient to objectify depression or anxiety. The questionnaires have been validated internationally,[10] and their validated Czech-language versions were used for the purpose of our study.

Data management and statistical analysis

Data excerpted from the medical records of patients and those obtained during interview were entered into Case Report Forms (CRFs); the forms are available to Czech centers both in printed and electronic format. Electronic CRFs were submitted online to the data management center (EUROObservational Research Program, European Heart House, Sophia Antipolis, France) and checked for completeness, consistency, and accuracy to be subsequently processed. Descriptive statistics were used to estimate the prevalence of risk factors and medication use at interview. Continuous variables are reported as mean ± SD and categorical variables as relative frequencies (percentage). Our limits for categorization of continuously monitored risk factors were identical to the target values of secondary prevention as per the respective guidelines from 2012.[3]

Results

After reviewing hospitalization medical records, a total of 624 patients were invited to the interview. The interview was attended by, and the required data were obtained from 406 responders. After subtracting those invited who either had died, been unable to attend the interview due to seriously impaired health or had moved away (ineligible, 76 patients), the response rate was 74.1%. Mean time between the index event (i.e., acute coronary event and/or revascularization) and the interview was 1.14 years. Basic demographic data and the mean numbers of major risk factors in our group are shown in Table 1. Mean age at the time of interview was 66.2 years (SD 8.9); the group was made up predominantly by men (75%). We found markedly increased mean values of BMI, waist circumference, and fasting glycaemia. However, mean systolic and diastolic BP, total and LDL-cholesterol and triglycerides were not markedly raised.

Table 2 gives the percentages of responders failing to meet the goal values of clinical and laboratory parameters defined by the 2012 guidelines for secondary prevention.

An increased body mass index (BMI ≥ 25 kg/m^2) was found in 85.5% of the patients, 44.8% were found to be obese (BMI ≥ 30 kg/m^2). Abdominal obesity (waist circumference ≥ 102 cm in males and ≥ 88 cm in females) was documented in 70.2% of the responders. Prevalence of smoking at the time of interview was 20%; of the original smokers, 47.8% continued to smoke after the event. A BP level in excess of the value recommended by the 2012 guidelines (BP < 140/90 or < 140/80 mmHg in patients with diabetes) was found in 55.1% of the group. Among patients on antihypertensive therapy, only 38.6 achieved the BP levels recommended in the 2012 guidelines. Regarding lipid metabolism parameters, target LDL cholesterol

Table 1 – Basic characteristics of the group of respondents, risk profile at the time of interview

N	406
Age (years)	66.2 (8.9)
Sex (% of females)	25.0
Body mass index (kg/m^2)	29.8 (5.0)
Waist circumference (cm)	106.1 (13.5)
Systolic blood pressure (mmHg)	135.0 (18.1)
Diastolic blood pressure (mmHg)	83.5 (10.8)
Heart rate (b.p.m.)	69.0 (10.4)
Total cholesterol (mmol/L)	4.17 (1.16)
HDL-cholesterol (mmol/L)	1.19 (0.28)
LDL-cholesterol (mmol/L)	2.22 (0.95)
Triglycerides (mmol/L)	1.7 (1.23)
Fasting glycemia (mmol/L)	6.54 (3.71)
HbA_{1c} (mmol/mol)	47.3 (20.8)
Coronary revascularization[a]	93.8

[a] Anamnestic or as inclusion criterion.

Table 2 – Basic risk factors categorized by 2012 guidelines[3] (%)

Body measures	
Overweight or obesity (BMI ≥ 25 kg/m²)	85.5
Obesity (BMI ≥ 30 kg/m²)	44.8
Increased waist circumference[a]	70.2
Smoking	
Current smokers	20.0
Continued smoking after index event[b]	47.8[m]
Hypertension	
Blood pressure ≥ 140/90 or ≥ 140/80 mmHg in diabetics	55.1
Blood pressure ≥ 160/100 mmHg	13.1
Blood pressure ≥ 180/110 mmHg	1.0
Inadequate blood pressure control, 2012 guidelines[c]	61.1[m]
Lipids	
Total cholesterol ≥ 5 mmol/L	16.9
Total cholesterol ≥ 4.5 mmol/L	30.3
LDL cholesterol ≥ 2.5 mmol/L	28.1
LDL cholesterol ≥ 1.8 mmol/L	63.5
Inadequate control of hypercholesterolemia, 2012 guidelines[d]	61.4[m]
Triglycerides ≥ 1.7 mmol/L	36.9
Low HDL[e]	32.8
Glucose metabolism	
Overt diabetes[f]	41.2
Overt diabetes by OGTT[g]	44.7
Inadequate control of diabetes[h]	89.0
Inadequate control of diabetes[i]	51.0
Impaired glucose tolerance (OGTT)[j]	22.9
Impaired fasting glycemia (OGTT)[k]	9.4
Normoglycemia by OGTT	23.0

[a] Waist circumference ≥ 102 cm in males or ≥ 88 cm in females.
[b] Proportion of current smokers related to the number of smokers at the time of index event.
[c] BP ≥ 140/90 or ≥ 140/80 mmHg in diabetics, related to the number of patients treated with antihypertensives.
[d] LDL cholesterol ≥ 1.8 mmol/L, related to the number of patients treated with lipid lowering drugs.
[e] < 1.0 mmol/L in males or < 1.2 mmol/L in females.
[f] Self reported diabetes or fasting glycemia ≥ 7 mmol/L.
[g] Self reported diabetes or fasting glycemia ≥ 7 mmol/L or 2h OGTT glycemia 7.8–11 mmol/L.
[h] Fasting glycemia ≥ 6.1 mmol/L, related to the number of patients with self reported diabetes.
[i] HbA_{1c} ≥ 53 mmol/mol, related to the number of patients with self reported diabetes.
[j] 2h OGTT glycemia 7.8–11 mmol/L, but absence of overt diabetes (see above).
[k] Fasting glycemia ≥ 5.6 mmol/L, but absence of overt diabetes or impaired glucose tolerance.
[m] Not related to total number of respondents.

levels in this high-risk population, as per the 2012 guidelines (< 1.8 mmol/L) were achieved by 36.5% of patients. Among patients treated with lipid-lowering drugs, 38.6% met the recommended targets. Hypertriglyceridemia was diagnosed in 36.9%, and low HDL levels in 32.8% of patients. The prevalence of previously diagnosed and new-onset diabetes was 41.2%, with another 23.4% of patients diagnosed with prediabetes. After inclusion of the 2-h OGTT values, overt diabetes was diagnosed in 44.7%, impaired glucose tolerance in 22.9%, and increased fasting glycemia in 9.4%, whereas only 23% patients were normoglycemic.

Table 3 – Cardiovascular pharmacotherapy used at the time of interview (%)

Antiplatelets or anticoagulants	97.8
Acetylsalicylic acid	88.4
Dual antiplatelet therapy	41.9
Anticoagulants	13.8
All antihypertensives	95.3
Antihypertensives for high blood pressure	70.3
Betablockers	81.3
ACE inhibitors or angiotensin receptor blockers	78.8
All diuretics	35.7
Furosemide and/or spironolactone	18.7
All lipid lowering agents	92.9
Statins	92.1
Fibrates	2.2
Ezetimibe or PCSK9 inhibitor	2.0
All antidiabetic agents	28.8
Oral antidiabetics	24.3
Insulin	7.9
In diabetics: peroral antidiabetics	80.0
insulin	25.4
Anti-anginal agents	11.8
Nitrates	6.2

Table 3 shows the percentage of patients on pharmacotherapy recommended in secondary prevention to control individual risk factors or for symptomatic therapy. Antiplatelet or anticoagulation therapy was used by 97.8% of patients while 88.6% of responders used acetylsalicylic acid, 41.9% were on dual antiplatelet therapy, and 13.8% used anticoagulants. Medications used as antihypertensives and, also, as cardioprotective agents were prescribed to 95.3% of patients. In terms of the drug classes used, beta-blockers were taken by 81.3%, ACE inhibitors and ARBs by 78.8%, with diuretics used by 35.7% of patients; lipid-lowering agents by 92.9%, statins by 92,1%, fibrates by 2.2% and ezetimibe or a PCSK-9 inhibitor in 2% of patients. Altogether, oral antidiabetics and/or insulin were used by 28.8% of patients (oral antidiabetics, 24.3%; insulin, 7.9%). Antianginal agents were used in only 11.8% of patients. A total of 95.3% of the patients reported being on regular follow-up by a cardiologist, 89% by an internist or a general practitioner, with 25.4% of patients also being treated by a diabetes specialist.

Table 4 shows adherence to a healthy lifestyle. Regular physical activity was reported by 15% only. An increase of previous physical activity after the index event, mainly by an increase in routine daily physical activity, was declared by less than half of the patients. A total of 50–68% of patients declared their adherence to various dietary recommendations of cardiovascular prevention, the most frequent one being increased fruit and vegetable intake. Among obese patients, little more than one third of patients adhered to dietary recommendations and regular physical activity (obviously exaggerated). Half of patients continued smoking after the index event, only a negligent fraction of them got advice from a smoking cessation center or pharmacological support in the form of nicotine replacement therapy, bupoprion or varenicline.

Table 4 – Self reported non-pharmacological secondary preventive measures and lifestyle changes initiated after the index event (%)	
Physical activity	
Regular physical activity[a]	15.0
Measures adopted to increase physical activity:	
- as recommended by the rehabilit. professional	8.4
- visits a fitness center	3.0
- has increased routine daily physical activity	36.5
Diet	
Lower fat diet	57.6
Change in fat composition	54.2
Reduced salt	60.6
Lower sugar diet	62.6
Reduced caloric intake	54.9
Increased consumption of fish	50.0
Increased fruit and vegetables intake	67.7
Measures adopted to brake smoking habit[b]	
Quit smoking after index event	54.7
Reduce smoking frequency after index event	33.1
Nicotin replacement therapy	6.2
Visited a smoking cessation center	0.6
Used varenicline or bupoprion	2.5
Measures adopted to reduce body weight[c]	
Adheres to specific dietary recommendations	37
Has regular physical activity	34.7
Used antiobesity drugs	1.5

[a] Regular physical activity of at least 30 minutes duration on average 5 times a week.
[b] Related to the number of current smokers in the month prior to the index event.
[c] Related to the number of obese patients at the time of interview.

Table 5 – Psychosocial factors and their management at the time of interview (%)	
Possible or probable depression[a]	21.4
Possible or probable anxiety[a]	19.5
Antidepressants	6.7
Anxiolytics	3.2

[a] According to HADS (see Methods section) categorized as a HADS score within the respective dimension ≥ 8.

The presence of depression and anxiety was assessed using the standard HADS tool (Table 5). A possible or probable depressive disorder (HADS score ≥ 8) was diagnosed in 21.4% of patients, and increased anxiety (HADS score ≥ 8) in 19.5%. Antidepressants and anxiolytics were used in a minority of these patients.

Discussion

Slightly more than half of smokers in our study quit smoking, and the prevalence of smoking (20%) among our responders is lower compared with the general Czech population;[11,12] and nearly the same as the European average (18.7%). Those of our patients who quit smoking did so more or less spontaneously, aware as they were about the harmfulness of smoking. Patients who continue smoking do so mostly due to heavy addiction. A total of 44% of these patients claim they would like to break the habit. Professional help, which is crucial to these patients, is lacking. In none of the hospitalization discharge reports of patients later investigated in our study did we find any referral to a smoking cessation center or any prescription of supportive medication. In the further course, of all those who continued smoking only one patient attended a smoking cessation center, 6.2% used smoking replacement therapy and only 2.5% bupropion or varenicline. Obviously, such a nihilistic approach to this high-risk population deserves a change: patients should be referred to smoking cessation centers, preferably at hospital discharge, and better reimbursement of supportive therapy is needed. Some hope can also be pinned on the recent stricter smoking control legislation.

The prevalence of overweight, obesity, and, abdominal obesity in particular, is very high. Compared to the previous EA studies, there has been a shift from overweight to more deleterious obesity and an increase in the prevalence of abdominal obesity. Our population sample is the 4th most obese and centrally obese in this European study. Obesity was associated with poorer blood pressure control, higher prevalence of diabetes and poorer glycemic control. A little more than one in three obese individuals declare adherence to diet and physical activity. The reality might be even less convincing and in agreement with the generally low physical activity as a major causative factor of obesity in our patients as well as in the general population. Obesity should be addressed as a priority on the whole population scale.

A most alarming finding in our study is the continuing high prevalence of diabetes. By including the OGTT into the evaluation scheme, overt diabetes was found in 44.7%, a figure considerably higher than in the European sample (28.6%). Similarly higher than in the European sample was the prevalence of impaired glucose tolerance (22.9%) and lower prevalence of normal glucose metabolism (23%). According to our as well as other analyses, impaired glucose metabolism (prediabetes) in CHD patients carries the same cardiovascular mortality risk such as manifest diabetes.[13,14] A positive finding is the increase in the spectrum of antidiabetics, their increasing prescription, and further improved long-term control of diabetes (HbA_{1c} < 53 mmol/mol) in the present study.

Control of arterial hypertension is also far from being satisfactory. Despite extensive, and due to insufficiently intensive use of antihypertensive medication, control of hypertension was achieved in only 38.9% of those treated for hypertension. Several agents with antihypertensive properties, e.g. beta-blockers or ACE inhibitors, are administered to non-hypertensive patients as well and prescription seems to be generally focused on cardioprotection rather than on targeted BP control. The increase in obesity and in the mean age of our patients may be aggravating factors. Blood pressure levels were measured during the interview after at least a 10-minute rest in the sitting position. The mean of the first two measurements used in the vast majority of our patients may overestimate BP levels compared to the mean of the second and third

measurements, the true prevalence of poor BP control so might be lower than reported here. Also positive is the very low prevalence of very high, uncontrolled hypertension (BP ≥ 180/110 mmHg): 1%.

There has been considerable fluctuation in the recommended BP levels in recent guidelines, those from 2007 with target BP < 130/80 mmHg to the 2012 guidelines with target BP < 140/90, (< 140/80 mmHg for those with diabetes).[3] Based on data from the SPRINT study,[15] despite methodological objections concerning the technique of BP measurement used in the study, the lower target values may be at play again. Such fluctuation may lead to uncertainty about the recommended BP levels.

The most remarkable progress throughout the EUROASPIRE studies has been achieved in the control of hypercholesterolemia.[6,7] Mean levels of total and LDL cholesterol further decreased in the present study. The decrease in cholesterol levels was a major factor behind the decrease in the CHD mortality in the Czech Republic.[16] Most patients were treated with lipid-lowering drugs, predominantly with statins, while ezetimibe and fibrates were used only occasionally. However, intensive statin treatment (atorvastatin 80 mg or rosuvastatin 40 mg/day) with proven higher protection against fatal and non-fatal CV events[17] was used in 23% (in 2012 in 2.4% only). Every new edition of guidelines recommended lower LDL cholesterol levels in the CHD population, the recent ones (<1.8 mmol/L) were achieved only in 36.5%, in those treated by lipid-lowering agents in 38.6%. Despite progress, higher dose statin therapy and combination therapy are needed. Impressive progress in hypercholesterolemia control in CHD secondary prevention is expected from PCSK9 inhibitors, though now hindered by costs of such therapy.

The risk factors adversely affecting the quality of life as well as prognosis of CHD patients include depression and anxiety. Possible or probable depressive or anxiety disorders were found in about one in five of our patients. Although adequate therapy has been shown to improve quality of life and improve compliance with other therapy,[19,20] only a minority was treated with antidepressants or anxiolytics. However, compared with previous studies, the proportion of treated individuals has increased.

In cardiovascular rehabilitation after a coronary event or revascularization, spa treatment is nearly exclusively confined to patients after cardiac surgery revascularization procedures. Outpatient cardiovascular rehabilitation, the duration of which is mostly time limited (± 12 weeks) was attended by 24.3% of our sample.

The study has several limitations. First, it includes only stabilized patients. The most severely sick possibly died during the period between hospitalization and interview or could not attend the interview. Our study documents the situation in two Czech regions – catchment areas of Pilsen University Hospital and IKEM (Prague 4). The responders were treated primarily in two centers offering highly specialized care and providing above-the-standard management to cardiac outpatients. This makes patient selection possible. However, the inter-regional differences may gradually become smaller.[21] Caution is to be exercised when reviewing self-reported data on physical activity, diet, and other lifestyle factors, as some degree of overestimation should be suspected.

A major advantage is the possibility, afforded by the standardized EUROASPIRE protocol, to compare data obtained over time in the Czech EUROASPIRE I–V studies as well as with data from other European countries.

Conclusions

The standard of comprehensive secondary prevention in patients with overt CHD, receiving, in the acute stage, high-quality and costly care, continues to be unsatisfactory. Continued pharmacological secondary prevention fails to achieve target values, particularly because of inadequately low medication doses prescribed. Likewise, patients are not sufficiently encouraged to change and adopt a healthy lifestyle as well as join training programs of cardiovascular rehabilitation, healthy diet, and smoking cessation. Specific care is required by patients with diabetes and impaired glucose metabolism who constitute the majority of our sample. Control of hypertension is to be improved and lipid-lowering therapy further intensified.

Conflict of interest
None.

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Ethical statement
Authors state, that the research was conducted according to ethical standards.
The study protocol was approved by the respective local ethics committees, all data were stored under the provisions of the National Data Protection Regulations.

Informed consent
All participants obtained and signed the informed consent form.

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