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Secondary prevention of coronary artery disease in Poland. Results from the POLASPIRE survey

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Abstract

Background: *The highest priority in preventive cardiology is given to patients with established coronary artery disease (CAD). The aim of the study was to assess the current implementation of the guidelines for secondary prevention in everyday clinical practice by evaluating control of the main risk factors and the cardioprotective medication prescription rates in patients following hospitalization for CAD.*

Methods: *Fourteen departments of cardiology participated in the study. Patients (aged ≤ 80 years) hospitalized due an acute coronary syndrome or for a myocardial revascularization procedure were recruited and interviewed 6–18 months after the hospitalization.*

Results: *Overall, 947 patients were examined 6–18 months after hospitalization. The proportion of patients with high blood pressure (≥ 140/90 mmHg) was 42%, with high low-density lipoprotein cholesterol (LDL-C ≥ 1.8 mmol/L) 62%, and with high fasting glucose (≥ 7.0 mmol/L) 22%, 17% of participants were smokers and 42% were obese. The proportion of patients taking an antiplatelet agent 6–18 months after hospitalization was 93%, beta-blocker 89%, angiotensin converting enzyme inhibitor or sartan 86%, and a lipid-lowering drug 90%. Only 2.3% patients had controlled all the five main risk factors well (non-smoking, blood pressure < 140/90 mmHg, LDL-C < 1.8 mmol/L and glucose < 7.0 mmol/L, body mass index < 25 kg/m^2), while 17.9% had 1 out of 5, 40.9% had 2 out of 5, and 29% had 3 out of 5 risk factors uncontrolled.*

Conclusions: *The documented multicenter survey provides evidence that there is considerable potential for further reductions of cardiovascular risk in CAD patients in Poland. A revision of the state funded cardiac prevention programs seems rational.* (Cardiol J 2020; 27, 5: 533–540)

Key words: coronary artery disease, risk factors, secondary prevention, smoking, hypertension, hypercholesterolemia

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Introduction

Coronary artery disease (CAD) is the single most common cause of death [1]. In recent years, a rapid development has been observed in pharmacological and invasive CAD treatment methods. Nevertheless, among acute myocardial infarction (MI) survivors, the one-year mortality rate following discharge from hospital in Poland is about 10% [2]. Several causes of this high mortality rate have been indicated, including inadequate lifestyle changes and poor control of risk factors, as well as inadequate pharmacotherapy [3]. Indeed, several surveys showed a considerable potential for further improvement in the field of secondary prevention in European countries, including Poland [4–7]. Interestingly, available data suggest beneficial trends in the control of some risk factors, while an adverse trend in others [8]. The guidelines regarding the management of risk factors have recently been updated [9–12], but little is known about what their impact was of on clinical practice in Poland.

The aim of the present study was to assess the implementation of recently published guidelines for secondary prevention in everyday clinical practice by assessing control of the main risk factors and the cardioprotective medication prescription rates in patients after hospitalization for CAD.

Methods

This study was carried out in four regions: one in the northern part of Poland, one in the central region and two in the south of the country. In each region, at least one teaching hospital and one municipal hospital took part in the survey. In total, 14 departments of cardiology from 12 different hospitals participated in the study. Seven departments were located in teaching and 7 in municipal hospitals. In each department medical records of consecutive patients hospitalized due to acute MI (with and without ST elevation), unstable angina, percutaneous coronary intervention (PCI) or scheduled for coronary artery bypass grafting (CABG) were reviewed and patients aged ≤ 80 years were identified retrospectively, excluding those who died during their in-hospital stay. If a patient was hospitalized more than once within the study period, only the first hospitalization was accepted as an index event. Centrally trained research staff undertook data collection using standardized methods and the same instruments in all centers. They reviewed patient medical notes, interviewed and examined the patients.

Participants were invited to take part in follow-up examinations 6 to 18 months after being discharged. Data on demographic characteristics, personal history of CAD, smoking status, blood pressure, fasting glucose, plasma lipids, and prescribed medications were obtained using a standardized data collection form. Smoking status was verified by the concentration of breath carbon monoxide using a smoker analyzer (Bedfont Scientific, Model Micro+). Persistent smoking was defined as smoking at the time of the interview among those who smoked during the month prior to the index event.

Patient height and weight were measured in a standing position without shoes or heavy outer garments, using standard scales with a vertical ruler (SECA). Body mass index (BMI) was calculated according to the following formula: BMI = weight [kg]/(height [m])^2. Waist circumference was measured using a metal tape horizontally in the mid-axillary line, midway between the lowest rim of the rib cage and the tip of the hip bone with the patient standing. Blood pressure was measured twice, on the right arm in a sitting position after at least 5 min of rest. For plasma lipid and glucose measurements a fasting venous blood sample was taken in the morning. For the present report, results of the analyses were done no later than 4 h after blood collection. was

The secondary prevention coefficient was calculated in the following way: for each controlled risk factor (non-smoking, blood pressure < 140/90 mmHg, low density lipoprotein cholesterol [LDL-C] < 1.8 mmol/L, glucose < 7.0 mmol/L, BMI < 25 kg/m^2) during follow-up examination one point was given. Additionally, one point was given for taking an antiplatelet agent and an angiotensin converting enzyme inhibitor (ACEI) or an angiotensin II receptor antagonist. Thus, the secondary prevention coefficient could vary from 0 to 7. The survey protocol was approved by the institutional Bioethics Committees.

Data management

All data were collected electronically through web-based data entry using a unique identification number for the center and individual. Data were submitted via the Internet to the data management center where checks for completeness, internal consistency and accuracy were run.

Statistical analysis

Categorical variables were reported as percentages and continuous variables as means ±

Table 1. Characteristics of the study population.

	STEMI N = 166	NSTEMI N = 259	UA N = 256	PCI N = 413	CABG N = 54	P	Total N = 1148
Age, years ± SD	61.0 ± 10.3	65.6 ± 8.2	66.4 ± 8.1	65.8 ± 7.7	65.7 ± 6.9	< 0.001	64.9 ± 8.4
Sex:							
Men	74.7%	68.3%	65.2%	72.6%	85.25	< 0.05	70.9%
Women	25.3%	31.7%	34.8%	27.4%	14.8%		29.1%
Duration of education*, years ± SD	12.5 ± 3.1	12.2 ± 3.1	12.1 ± 3.0	12.8 ± 3.2	11.7 ± 3.3	< 0.05	12.4 ± 3.1
Employed*	41.9%	24.2%	28.65	31.0%	32.6%	< 0.05	30.7%
Index hospitalization in teaching hospital	83.2%	82.3%	67.3%	93.8%	100.0%	< 0.001	84.1%
Participation in a rehabilitation program following the index hospitalization	51.5%	36.9%	13.4%	16.2%	48.8%	< 0.001	26.4%
Specialization of the physician*:							
Cardiologist	86.6%	84.1%	79.3%	87.1%	90.1%	0.08	84.8%
General	80.6%	85.6%	88.5%	85.7%	90.7%	0.28	85.8%
Practitioner							
Diabetologist	9.7%	9.7%	12.0%	10.9%	9.3%	0.94	10.6%
Other physician	1.5%	2.1%	4.6%	3.1%	2.3%	0.45	3.0%
No regular check-ups	1.5%	0.5%	2.3%	0.05	0.0%	< 0.05	0.8%

*Among subjects who participated in the follow-up examination, as declared by the patients; CABG — coronary artery bypass grafting; NSTEMI — non-ST-segment elevation myocardial infarction; PCI — percutaneous coronary intervention; SD — standard deviation; STEMI — ST-segment elevation myocardial infarction; UA — unstable angina

standard deviation. The Pearson χ^2 test was applied to all categorical variables. Normally distributed continuous variables were compared by using the Student t test or analysis of variance. Variables without normal distributions were evaluated using the Mann–Whitney U test or the Kruskal–Wallis analysis of variance. A two-tailed p value of less than 0.05 was regarded as indicating statistical significance.

Results

The medical records of 1148 patients were reviewed and included in the analyses, among them 840 (73.2%) were hospitalized in teaching and 308 (26.8%) in municipal hospitals. Characteristics of the study population are presented in Table 1. Patients from the ST-segment elevation MI (STEMI) group were the youngest, and the proportion of women was highest in the unstable angina group.

Cardioprotective drug prescription rates at discharge are shown in Table 2. The prescription rate of antiplatelet drugs, ACEI or angiotensin II receptor antagonists, calcium antagonists, diuretics, lipid-lowering drugs, and antidiabetic drugs differed between the index diagnoses and the prescription rate of anticoagulants was similar across all groups. Among patients hospitalized due to acute coronary syndrome 80.0% were prescribed two antiplatelet drugs at discharge, the highest proportion were among patients with STEMI and the lowest proportion among patients with the unstable group ($p < 0.001$). Acenocumarol or warfarin were prescribed to 5.1% of discharged patients, while heparin (including low-molecular-weight heparins) was prescribed to 3.8% of patients. New oral anticoagulants were prescribed to 7.8% of discharged patients. Overall, 98.9% of patients were prescribed at least one antiplatelet drug or anticoagulant, with a variation across groups of borderline significance (98.8% in STEMI, 97.3% in non-ST-segment elevation MI [NSTEMI], 97.3% in the unstable angina group, 99.8% in PCI, and 100% in CABG group, $p = 0.05$). ACEIs were prescribed to 78.0% of discharged patients and angiotensin II receptor antagonists to 10.8% of patients. Insulin was prescribed to 10.0% of discharged patients, whereas oral antidiabetic drugs were prescribed to 25.3% of patients, including metformin, which was prescribed to 23.2% of patients.

Out of the 1148 invited patients, 947 participated in the follow-up examination 6–18 months after

Table 2. Prescription rates of cardioprotective drugs at discharge.

	STEMI	NSTEMI	UA	PCI	CABG	P	Total
Antiplatelets:							
At least one agent	98.8%	96.1%	96.5%	99.8%	98.2%	< 0.01	98.0%
Two agents	94.6%	81.5%	63.7%	95.2%	27.8%	< 0.001	81.8%
Beta-blockers	92.8%	87.3%	91.4%	92.7%	96.3%	0.07	91.4%
ACEI/sartans	84.3%	86.5%	86.3%	94.0%	83.3%	< 0.001	88.7%
Calcium antagonists	7.8%	22.4%	28.9%	35.1%	35.2%	< 0.001	26.9%
Diuretics*	21.1%	41.7%	50.8%	47.9%	57.4%	< 0.001	43.7%
Potassium sparing diuretics	25.9%	20.9%	18.8%	20.6%	14.8%	0.35	20.7%
Lipid lowering drugs:	92.8%	91.9%	92.2%	97.6%	98.2%	< 0.01	94.4%
Statins	92.8%	91.1%	91.8%	97.3%	98.2%	< 0.01	94.1%
Fibrates	0.6%	1.5%	5.5%	5.1%	0.0%	< 0.01	3.5%
Ezetimibe	0.6%	1.2%	2.3%	1.2%	1.9%	0.60	1.4%
Antidiabetic agents	20.5%	30.5%	27.7%	38.3%	27.8%	< 0.001	31.1%
Anticoagulants	15.1%	17.0%	16.8%	16.0%	14.8%	0.98	16.2%

*Thiazides or loop diuretics; ACEI — angiotensin converting enzyme inhibitors; CABG — coronary artery bypass grafting; NSTEMI — non-ST--segment elevation myocardial infarction; PCI — percutaneous coronary intervention; STEMI — ST-segment elevation myocardial infarction; UA — unstable angina

Table 3. Proportions of patients who did not reach treatment goals 6–18 months after discharge.

	STEMI	NSTEMI	UA	PCI	CABG	P	Total
Smoking	21.9%	18.7%	10.6%	18.2%	14.0%	< 0.05	16.9%
Blood pressure ≥ 140/90 mmHg	41.9%	46.5%	42.4%	40.7%	23.3%	0.09	41.7%
LDL-C ≥ 1.8 mmol/L	57.5%	65.0%	66.4%	58.5%	69.8%	0.16	62.0%
Glucose ≥ 7.0 mmol/L	19.6%	24.9%	19.4%	21.7%	20.9%	0.70	21.5%
Body mass index ≥ 25 kg/m^2	87.3%	85.8%	87.0%	84.0%	76.9%	0.57	85.1%
Body mass index ≥ 30 kg/m^2	36.6%	47.2%	39.8%	44.1%	26.2%	0.06	41.9%
Waist ≥ 102 cm in men and ≥ 88 cm in women	57.5%	68.4%	69.6%	63.5%	48.8%	< 0.05	64.4%

CABG — coronary artery bypass grafting; LDL-C — low density lipoprotein cholesterol; NSTEMI — non-ST-segment elevation myocardial infarction; PCI — percutaneous coronary intervention; STEMI — ST-segment elevation myocardial infarction; UA — unstable angina

being discharged from hospital. The mean period of time from discharge to the follow-up examination was 1.01 ± 0.30 years (in 52% of cases the period was greater than 1 year). Out of all participants, 16.1% declared that they were smokers. Additionally, 0.8% declared that they do not smoke, however, they had an increased concentration of breath carbon monoxide (> 10 ppm). Overall, 16.9% of the study participants were smokers. The smoking rate differed significantly across groups, the highest being in the ST-elevation group (Table 3). Among patients who smoked during the prior month before the index event, 55.8% were smoking 6–18 months after being discharged, with no significant difference between the groups (STEMI group: 46.7%, NSTEMI group: 56.3%, unstable angina group: 53.9%, PCI group: 61.5%, CABG group: 66.7%; p = NS). It was observed that 41.7% of participants had high blood pressure, 62.0% had high LDL-C level, 21.5% had fasting glucose ≥ 7.0 mmol/L, 41.9% were obese while 85.1% were overweight or obese 6–18 months after being discharged. Mean systolic blood pressure was 134.3 ± 20.3 mmHg, diastolic blood pressure was 79.9 ± 11.5 mmHg, mean LDL-C level was 2.18 ± ± 0.94 mmol/L, mean BMI was 29.5 ± 4.5 kg/m^2 and mean waist circumference 103.5 ± 11.7 cm in men and 100.0 ± 12.4 cm in women.

The majority of persistent smokers did not attempt to quit smoking following the index hospitalization (Table 4). Less than 1 in 7 participants was physically active at the recommended level,

Table 4. Patients' lifestyles at the time of interview 6–18 months after discharge (as declared by the patients).

	STEMI	NSTEMI	UA	PCI	CABG	P	Total
Persistent smokers having attempted to quit smoking since hospital discharge	6.7%	10.8%	4.3%	10.9%	0.0%	0.76	8.7%
Obese patients having attempted actively to lose weight in last month	49.0%	52.7%	58.1%	57.1%	45.4%	0.74	55.0%
Overweight or obese patients having attempted actively to lose weight in last month	41.9%	40.8%	40.1%	43.1%	32.3%	0.80	41.3%
Patients having regular physical activit 30 min on average five times a week	14.0%	15.2%	12.0%	14.2%	20.9%	0.62	14.2%
Patients trying to reduce salt intake	65.45	69.2%	66.8%	68.4%	72.1%	0.91	67.9%
Patients trying to reduce fat intake	73.5%	72.2%	70.1%	75.5%	72.1%	0.70	73.1%
Patients trying to reduce calories intake	57.4%	58.1%	58.5%	67.5%	67.4%	0.07	62.0%
Patients trying to increase vegetables and fruits intake	71.3%	71.2%	71.0%	72.7%	81.4%	0.71	72.2%

CABG — coronary artery bypass grafting; NSTEMI — non-ST-segment elevation myocardial infarction; PCI — percutaneous coronary intervention; STEMI — ST-segment elevation myocardial infarction; UA — unstable angina

Table 5. Proportion of patients taking cardioprotective drugs 6–18 months after discharge from the hospital.

	STEMI	NSTEMI	UA	PCI	CABG	P	Total
Antiplatelets	94.2%	95.0%	88.0%	94.3%	93.0%	< 0.05	92.9%
Beta-blockers	88.3%	87.9%	86.6%	91.8%	95.4%	0.19	89.4%
ACEI/sartans	81.8%	86.4%	84.8%	90.3%	65.1%	< 0.001	85.9%
Calcium antagonists	15.3%	32.3%	29.5%	34.4%	20.9%	< 0.001	29.5%
Diuretics*	36.5%	53.5%	50.7%	40.8%	67.4%	< 0.01	49.0%
Potassium sparing diuretics	25.7%	28.8%	15.2%	15.3%	27.9%	< 0.001	20.2%
Lipid lowering drugs:	87.6%	90.4%	85.7%	94.0%	90.7%	< 0.05	90.3%
Statins	87.6%	89.4%	84.3%	94.0%	90.7%	< 0.01	89.8%
Fibrates	1.5%	1.5%	6.0%	4.6%	0.0%	< 0.05	3.6%
Ezetimibe	1.5%	2.0%	3.2%	2.8%	2.3%	0.84	2.5%
Antidiabetic agents	24.8%	35.9%	31.5%	38.6%	32.6%	0.05	34.1%
Anticoagulants	8.0%	15.2%	14.8%	15.6%	14.0%	0.23	14.15%

*Thiazides or loop diuretics; ACEI — angiotensin converting enzyme inhibitors; CABG — coronary artery bypass grafting; NSTEMI — non-ST-segment elevation myocardial infarction; PCI — percutaneous coronary intervention; STEMI — ST-segment elevation myocardial infarction; UA — unstable angina

and about half of the obese patients had attempted to lose weight.

The proportion of patients taking antiplatelets, ACEIs/angiotensin II receptor antagonists, diuretics, lipid-lowering drugs, and antidiabetic agents at the time of the follow-up examination differed significantly between the indexed groups (Table 5). Acenocumarol or warfarin were prescribed to 5.4% of patients, low-molecular-weight heparins to 0.2% of patients, while 8.6% of patients were prescribed new oral anticoagulants. Overall, 97.0% of patients were prescribed at least one antiplatelet drug or anticoagulant, with a variation across groups of a borderline significance (94.9% in STEMI group, 98.0% in NSTEMI group, 94.9% in unstable angina group, 99.3% in PCI, and 100% in CABG group, $p = 0.05$). ACEIs were prescribed to 70.5% of patients and angiotensin II receptor antagonists to 15.4% of patients. Among all patients, 9.9% were prescribed insulin, whereas 30.4% were prescribed oral antidiabetic drugs, including metformin, which was prescribed to 28.3% of patients. A statin in combination with ezetimibe was prescribed to 2.3% whereas high dose statin in combination with

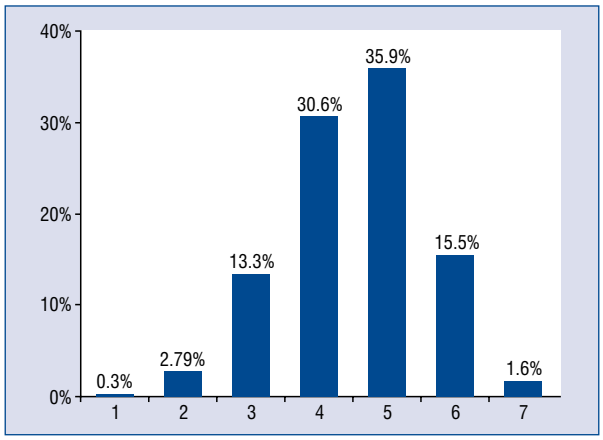

Figure 1. Distribution of the secondary prevention coefficient values.

ezetimibe to 1.8% of patients. A statin in combination with a fibrate was prescribed to 3.3% whereas high dose statin in combination with a fibrate to 1.8% of patients.

The mean secondary prevention coefficient was 4.52 ± 1.06 (median value: 5; interquartile range: 4, 5). Its value was equal to 7 in only 1.6% of patients, while 17.1% had a secondary prevention coefficient of at least 6 (Fig. 1). The secondary prevention coefficient value was related to age, employment and the specialization of the physician who, according to the patient, had decided about their management (Table 6). The secondary prevention coefficient was not related to sex, education, index diagnosis or hospitalization teaching hospitals. It was observed that only 2.3% of patients had all main risk factors well controlled (non-smoking, blood pressure < 140/90 mmHg, LDL-C < 1.8 mmol/L, glucose < 7.0 mmol/L, BMI < 25 kg/m^2), while 18.0% had 1 out of 5, 40.8% had 2 out of 5, and 29.0% had 3 out of 5 risk factors uncontrolled. Finally, 0.9% of study participants had all main risk factors uncontrolled.

Table 6. The secondary prevention coefficient values according to subgroups of patients.

Subgroup	Secondary prevention coefficient ± SD	P
Age [years]:		< 0.01
< 60	4.36 ± 1.19	
60–70	4.50 ± 0.96	
≥ 70	4.65 ± 1.10	
Sex:		0.52
Men	4.54 ± 1.05	
Women	4.49 ± 1.09	
Duration of education [years]:		0.17
≤ 11	4.47 ± 1.05	
> 11	4.57 ± 1.07	
Index diagnosis:		0.19
STEMI	4.51 ± 1.11	
NSTEMI	4.41 ± 1.09	
Unstable angina	4.47 ± 1.01	
PCI	4.63 ± 1.06	
CABG	4.50 ± 1.04	
Index hospitalization in a teaching hospital:		0.46
Yes	4.53 ± 1.06	
No	4.46 ± 1.07	
Rehabilitation program following the index hospitalization:		0.12
Participated	4.61 ± 1.01	
Not participated	4.49 ± 1.08	
Specialization of the physician:		< 0.05
Cardiologist	4.57 ± 1.06	
Other physician	4.30 ± 1.05	
No regular health check-ups	4.13 ± 1.13	
Professionally active	4.49 ± 1.07	< 0.05
Professionally inactive	4.66 ± 1.03	
Total	4.52 ± 1.06	

STEMI — ST-segment elevation myocardial infarction; NSTEMI — non-ST-segment elevation myocardial infarction; PCI — percutaneous coronary intervention; CABG — coronary artery bypass grafting; SD — standard deviation

Discussion

In general, results suggest a considerable potential for further reduction of cardiovascular risk in CAD patients. Recently, not much data concerning the quality of secondary prevention of CAD in Poland has been published. In a nation-wide registry of patients hospitalized due to MI, the prescription rate of statins, beta-blockers and ACEIs was comparable to results obtained in this study, whereas the prescription rate of antiplatelet drugs was slightly lower [13]. In a single center analysis of patients undergoing CABG, the use of antiplatelets, ACEIs or angiotensin II receptor antagonists and statins were slightly lower when compared to prescription rates in the CABG group in the

present study [14]. Furthermore, two surveys, which included patients hospitalized due to CAD in 2011–2013 showed very similar prescription rates at discharge, and significantly lower cardioprotective drug usage in the post discharge period compared to the present study [15, 16]. The control of main cardiovascular risk factors was at similar levels [14, 15]. Results of the EUROASPIRE V survey were recently published [5]. Generally, the average control of main risk factors in 81 centers from 27 countries were worse compared to the results obtained in the present survey (e.g. smoking rate 19% vs. 17%, high LDL-C 71% vs. 62%), with the exception of blood pressure, which was controlled at a very similar level. Similar conclusions can be drawn from a comparison of Polish patients with stable CAD with patients from other European countries participating in the CLARIFY registry [17].

Although BMI, waist, and LDL-C level were the worst controlled risk factors (Table 3), it should be emphasized that the present results suggest insufficient control of all main cardiovascular risk factors. The present results confirm the previous suggestion that sex and index diagnosis are not related to the secondary prevention goal achievement in clinical practice, at least in Poland [15]. Interestingly, hospitalization in a teaching hospital was not significantly related to the secondary prevention coefficient. Results from the present study suggest that patients managed by cardiologists achieve the recommended secondary prevention goals more often. Although the influence of a number of confounders cannot be excluded, including income. The WOBASZ study also showed specialists more often provide preventive support as compared to general practitioners [18]. Although based on the present results, a cause-and-effect relationship cannot be proved, it was suggested that cardiologist care is associated with lower mortality following acute coronary syndrome [19].

Organizational interventions for the secondary prevention of CAD have been shown to reduce mortality in CAD patients, further, experts of the Polish Cardiac Society have recently announced a new organizational system named "Managed care after myocardial infarction" [3, 20]. The system consists of four modules: complete revascularization, education and rehabilitation program, electrotherapy including implantable cardioverter-defibrillators, biventricular pacing when appropriate and periodical cardiac consultations, which last 12 months. It also contains a quality of care assessment based on clinical measures (e.g. risk factor control, rate of complete myocardial revascularization, etc.), as well as rate of cardiovascular events [3]. Preliminary results of the new system are encouraging [21].

Limitations of the study

The present study had some limitations. Firstly, was the inability to assess the impact of implementing secondary prevention guidelines on the risk of cardiovascular complications. Secondly, participants of the present study were not representative of all CAD patients. Participants were limited to those who had experienced an acute CAD event or had undergone a revascularization procedure. Therefore, the present results should not be directly applied to other CAD patients. Thirdly, only patients aged ≤ 80 years were studied, therefore results should not be applied directly to older patients. Fourthly, assessment of risk factor control at the discharge from hospital could not be done. Finally, the doses of cardioprotective drugs taken by patients were not analyzed. It is possible that blood pressure, lipids, and glucose were not controlled in some cases due to insufficient doses of the prescribed drugs. It should also be noted that no information on the patient compliance with instructions regarding prescriptions was lacking. It is reasonable to suspect that some patients had been taking their medications irregularly [22–24]. According to a previously published study patients' self-reported drug intake is often misleading, as in over 40% of subjects reporting regular intake of prescribed drugs objective assessment did not confirm this statement [25]. However, an important advantage of the analysis is that results are not based just on abstracted medical record data but on face-to-face interviews and examinations using the same protocol and standardized methods and instruments. Therefore, this analysis provides reliable information on lifestyle, risk factors, and therapeutic management for secondary prevention of CAD.

Conclusions

This multicentre survey provides evidence that there is a considerable potential for further reduction of cardiovascular risk in CAD patients in Poland. A revision of the state funded cardiac prevention program seems rational.

Conflict of interest: None declared

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