

# Sources of patients' knowledge about cardiovascular disease prevention in Poland – a pilot study

Ewa Kowalewska<sup>1</sup>, Katarzyna Komnacka<sup>1</sup>, Krzysztof Wójcicki<sup>1</sup>, Artur Dziewierz<sup>1,2</sup>, Dariusz Dudek<sup>2</sup>, Tomasz Tokarek<sup>1</sup>

<sup>1</sup>Department of Cardiology and Cardiovascular Interventions, University Hospital, Krakow, Poland

<sup>2</sup>2<sup>nd</sup> Department of Cardiology, Institute of Cardiology, Jagiellonian University Medical College, Krakow, Poland

Adv Interv Cardiol 2022; 18, 1 (67): 27–33  
DOI: <https://doi.org/10.5114/aic.2022.116461>

## Abstract

**Introduction:** Education about coronary artery disease (CAD) is the basis of the prevention programs to limit the impact of CAD on patients' health.

**Aim:** To identify patterns characterizing several groups of patients that might help to create targeted and more efficient education projects.

**Material and methods:** Data were collected using a self-designed questionnaire assessing sociodemographic and clinical profile, sources of knowledge, and expectations about education on heart diseases. It was conducted among patients at the cardiology department and at the patients' congress. Data were collected between July 2016 and October 2018 at the cardiology department and 5–7 December 2018 during a patients' congress.

**Results:** Of 486 respondents 74% were male, and the median age was 68 years (interquartile range (IQR): 62–73). History of CAD was reported by 68% of patients. Cardiologists were reported as a source of knowledge more often by men than women. Patients with higher education were more likely to use books and internet sources, but they relied less on education provided by cardiologists.

**Conclusions:** Regardless of the sociodemographic or clinical factors, appointments with health care professionals were indicated as the most preferable form of education, and physicians were perceived as the most reliable and trusted source of knowledge.

**Key words:** coronary artery disease, education, knowledge, lifestyle, prevention.

## Summary

Patients' knowledge of coronary heart disease and prevention is insufficient. Thus, we sought to identify sources of patients' knowledge about cardiovascular prevention. Patients perceive physicians as the most reliable and trusted source of knowledge regardless of sociodemographic and clinical factors. Patients with higher education more often obtain their knowledge from books and the internet, whereas patients with lower levels of education more often rely on their cardiologist for their knowledge.

## Introduction

Cardiovascular disease (CVD) is the leading cause of death in Poland [1–3]. It is strongly related to several risk factors, most of which can be modified and controlled. The major risk factors of CVD that can be controlled (modifiable) are: high blood pressure; high blood cholesterol levels; smoking; diabetes; overweight or obesity; lack of physical activity; unhealthy diet and stress. Those that cannot be controlled (conventional) are: age

(simply getting older increases risk); sex (men are generally at greater risk of coronary artery disease (CAD)); family history; and race [4]. It has been shown that the proper management of those risk factors leads to a significant reduction in cardiac morbidity and mortality. Several studies [5–7] have demonstrated that knowledge of risk factors for CVD is poor among cardiological patients [8, 9]. However, the majority of patients expressed the need and a desire for more information [10]. In most

## Corresponding author:

Tomasz Tokarek MD, PhD, Department of Cardiology and Cardiovascular Interventions, University Hospital, 2 Jakubowskiego St, 30-688 Krakow, Poland, e-mail: [tomek.tokarek@gmail.com](mailto:tomek.tokarek@gmail.com)

**Received:** 26.04.2022, **accepted:** 2.05.2022.

European countries, information about heart disease such as heart failure is obtained from a general practitioner and then from a medical specialist. However, in Poland, most patients tend to visit the medical specialist in the first place [11]. Even the standard education provided during hospitalization significantly improves patients' awareness, and the result might be magnified by further educational programs [12–15]. Currently, in Poland, the Kordian National Healthcare Program is provided for the prevention and education of CVD [16]. Despite all efforts undertaken for prevention, there is a paucity of data on patient preferences regarding sources of knowledge and forms of patient education on CAD.

## Aim

We sought to determine the most popular and the most attractive way of education for the prevention of CVD.

## Material and methods

This study was designed to evaluate the sources of patients' knowledge about cardiovascular prevention according to sociodemographic and clinical profiles, which might be a basis for further projects on the creation and improvement of personalized educational programs. The study group consisted of 486 respondents including 200 patients admitted to the 2<sup>nd</sup> Department of Cardiology and Cardiovascular Interventions University Hospital in Krakow, Poland between July 2016 and October 2018 and 286 participants at the First Cardiologists' Congress during the New Frontiers in Interventional Cardiology workshop in 2018. Data were collected using a 24-item self-designed questionnaire in Polish language (Figure 1). It was composed of 6 questions about the sociodemographic profile, 7 questions about the clinical profile, 7 questions assessing sources of knowledge and patients' expectations and 4 questions referring to the self-assessed level of knowledge and motivation for CAD prevention. In questions regarding actual and preferable knowledge sources, patients were allowed to select more than one answer (multiple dichotomy). The inclusion criteria were: consent for participation in the study and hospitalization in the 2<sup>nd</sup> Department of Cardiology and Cardiovascular Interventions University Hospital in Krakow, Poland between July 2016 and October 2018 or participation in the First Cardiologists' Congress during the New Frontiers in Interventional Cardiology workshop in 2018. The only exclusion criterion was the lack of consent for participation in the study. All included patients provided signed informed consent to participate in the study and consent to the processing of personal data. The study protocol was approved by the local ethics committee. The study was conducted in accordance with the ethical principles of clinical research based on the Declaration of Helsinki with its later amendments.

## Statistical analysis

The normality of the data was assessed with Shapiro-Wilk test where applicable. The categorical variables were presented as number (percentage) and compared with the  $\chi^2$  test. Normal distribution was observed for none of the quantitative variables; therefore they were presented as median and interquartile range (IQR) and compared with the Mann-Whitney test. Spearman's correlation coefficient was applied to assess possible connections between the quantitative variables. The level of statistical significance was set at  $p < 0.05$ . The analyses were performed with Statistica v13 software (StatSoft, Inc., Krakow, Poland).

## Results

The baseline characteristics of included patients and comparison of the popularity of knowledge sources are presented in Tables I and II. Of 486 patients included in the study, 332 (68%) suffered from CAD; 168 (35%) had undergone PCI; 363 (75%) reported hypertension, 130 (27%) diabetes, 65 (13%) atrial fibrillation.

Cardiologists were reported as a source of knowledge more often by men than women (71% vs. 54%;  $p = 0.001$ ) (Table I). Patients with CAD were more often educated by cardiologists (71% in CAD group vs. 42% in non-CAD group;  $p = 0.001$ ). However, they used internet sources less often than patients with no CAD history (CAD vs. non-CAD: 25% vs. 41%;  $p = 0.002$ ). Patients with higher education were more likely to use books (49% vs. 30%;  $p = 0.001$ ) and internet sources (39% vs. 25%;  $p = 0.004$ ) (Table II), but they were less prone to follow education provided by cardiologists, as compared to patients with lower levels of education (55% vs. 67%;  $p = 0.02$ ) (Table I). Conversely, education provided by cardiologists and TV programs was more common in patients with a history of percutaneous coronary intervention (PCI) (for cardiologists and TV, respectively: 79% vs. 56%,  $p = 0.001$ ; 30% vs. 16%;  $p = 0.001$ ). Furthermore, a cardiologist as a source of knowledge was also more frequently reported in married patients (married vs. unmarried, widowed or divorced, respectively: 69% vs. 56%;  $p = 0.01$ ) (Table I). Interestingly, 29% of respondents stated that they used help of the family to comply with medical recommendations. Moreover, almost a quarter of patients over 65 years old used internet sources (Table II). There was no difference in the popularity of individual online sources between those under 65, low and high educated, or rural and urban people in using online sources, except that more patients without a history of CAD seemed to use internet forums ( $p = 0.06$ ). Detailed data are presented in Table III. The self-assessed level of knowledge correlated with the rate of provided education; however, the correlation was weak (Spearman's rho:  $R = 0.26$ ;  $p = 0.001$ ). Patients indicated

**Evaluation of sources of patients' knowledge about coronary artery disease**

**1. Gender**  
Mark only one oval.

female  
 male

**2. Age (years)**  
\_\_\_\_\_

**3. Place of residence**  
Mark only one oval.

rural area  
 city (lower than 50.000 citizens)  
 city (50.000 - 100.000 citizens)  
 city (over 100.000 citizens)

**4. Education**  
Mark only one oval.

primary (6 years of primary school)  
 basic vocation (vocational school)  
 secondary (high school or technical school)  
 higher (university)

**5. Professional activity**  
Mark only one oval.

professionally active - physical work  
 professionally active - intellectual work  
 student  
 pensioner  
 unemployed

**6. Current marital status**  
Mark only one oval.

married  
 single  
 divorced  
 widow/widower

**7. Which of the following chronic diseases have you been diagnosed with? Which diseases do you take medication for?**  
Check all that apply.

I have:  diabetes  hypertension  hypercholesterolemia  thyroid disease

I take medications for:

**8. Please tick if you have ever had:**  
Check all that apply.

heart attack  
 stroke  
 PCI procedure - percutaneous coronary intervention („stents“)  
 CABG procedure - coronary artery bypass grafting („heart bypass“)  
 Other: \_\_\_\_\_

**9. Do you smoke, or have you ever smoked?**  
Mark only one oval.

Yes, I do.  
 I don't smoke, but I did in the past.  
 No, I have never smoked.

**10. When have you been diagnosed with coronary artery disease? (in months or years)**  
\_\_\_\_\_

**11. Have you ever been hospitalized because of heart disease? If so, how many times? (Please indicate the number).**  
\_\_\_\_\_

**12. Have you been provided education about risk factors of coronary artery disease during your staying in a cardiological ward?**  
Mark only one oval.

Yes, I have - during each staying in hospital  
 Yes, I have but not during each staying in hospital  
 No, I haven't  
 I don't remember

**13. How do you rate the efficiency of education about the living with the heart disease which was provided by your doctors?**  
Mark only one oval.

1    2    3    4    5

very bad, education was not provided                        very good, the recommended lifestyle was explained

**14. How do you rate the efficiency of education about the living with the heart disease which was provided by the nursing staff?**  
Mark only one oval.

very bad, education was not provided    1    2    3    4    5    very good, the recommended lifestyle was explained

**15. How often do you visit doctors listed below?**  
Mark only one oval per row.

	once a month or more often	every month - every 3 months	every 3 months - every 6 months	every 6 months - every year	less often than every year
General Practitioner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cardiologist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**16. How do you rate your knowledge about risk factors of coronary artery disease?**  
Mark only one oval.

I have no knowledge    1    2    3    4    5    I have full knowledge

**17. How do you rate the level of care about your own health?**  
Mark only one oval.

I don't care about it at all    1    2    3    4    5    I follow all the orders

**18. How do you rate the level of your motivation to look for information about the heart diseases?**  
Mark only one oval.

I don't look for these information at all    1    2    3    4    5    I look for these information intensively

**19. How much does your heart disease affect your daily activity?**  
Mark only one oval.

It doesn't affect it at all    1    2    3    4    5    It makes me unable to function

**20. What sources of knowledge do you use to find out how to live with heart disease?**  
Check all that apply.

participation in the Patients' Club  
 General Practitioner  
 cardiologist  
 family, friends  
 TV  
 books, newspaper, information brochure  
 the Internet  
 I don't look for information about that  
 Other: \_\_\_\_\_

**21. What source of knowledge do you find the most valuable?**  
\_\_\_\_\_

**22. What internet source of knowledge do you use to find out about you disease?**  
Check all that apply.

website/web portal recommended by my doctor  
 social media  
 online forums  
 I don't use any internet source of knowledge  
 Other: \_\_\_\_\_

**23. Who helps you to follow your doctor's recommendations (administer medicines, take care of the proper diet)?**  
Mark only one oval.

I take care of myself  
 family (spouse, children)  
 medical caretaker or community nurse

**24. What is your preferable form of education about the risk factors of coronary artery disease? (f.e. meetings with doctors, information brochure etc.)**  
Check all that apply.

meetings with health care professionals  
 information brochure  
 TV and radio programmes  
 material on websites  
 Other: \_\_\_\_\_

Figure 1. Questionnaire

**Table I.** Knowledge sources used by patients in groups according to sociodemographic and clinical factors. Part 1. Data presented as number (percentage)

Variable	GP	P-value	Cardiologist	P-value	Family	P-value
All respondents (n = 486)	204 (42%)	–	316 (65%)	–	83 (17%)	–
Gender	Male (n = 270)	119 (44%)	192 (71%)	0.001	46 (17%)	1.0
	Female (n = 216)	84 (39%)	117 (54%)		37 (17%)	
Age	< 65 years (n = 167)	68 (41%)	119 (71%)	0.4	27 (16%)	0.9
	≥ 65 years (n = 319)	134 (42%)	207 (65%)		51 (16%)	
Education	Primary, secondary or vocational (n = 359)	158 (44%)	248 (67%)	0.02	61 (17%)	0.6
	Higher (n = 127)	48 (38%)	71 (55%)		19 (15%)	
Marital status	Married (n = 335)	141 (42%)	231 (69%)	0.01	54 (16%)	0.7
	Not married (n = 151)	62 (41%)	85 (56%)		27 (18%)	
Place of residence	Rural area (n = 118)	57 (48%)	83 (70%)	0.3	20 (17%)	1.0
	Urban area (n = 368)	147 (40%)	232 (63%)		59 (16%)	
Previous MI	No history (n = 318)	118 (37%)	181 (57%)	0.001	57 (18%)	0.2
	History of MI (n = 168)	82 (49%)	124 (74%)		22 (13%)	

GP – general practitioner, MI – myocardial infarction.

**Table II.** Knowledge sources used by patients in groups according to sociodemographic and clinical factors. Part 2. Data presented as number (percentage)

Variable	Television	P-value	Books	P-value	Internet	P-value	None	P-value
All respondents (n = 486)	107 (22%)	–	175 (36%)	–	146 (30%)	–	29 (6%)	–
Gender	Male (n = 270)	51 (19%)	89 (33%)	0.1	81 (30%)	1.0	14 (5%)	0.4
	Female (n = 216)	56 (26%)	86 (40%)		63 (29%)		15 (7%)	
Age	< 65 years (n = 167)	38 (23%)	55 (33%)	0.6	63 (38%)	0.003	7 (4%)	0.2
	≥ 65 years (n = 319)	73 (23%)	115 (36%)		73 (23%)		26 (8%)	
Education	Primary, secondary or vocational (n = 359)	79 (22%)	108 (30%)	0.001	90 (25%)	0.004	18 (5%)	0.1
	Higher (n = 127)	27 (21%)	62 (49%)		50 (39%)		11 (9%)	
Marital status	Married (n = 335)	70 (21%)	114 (34%)	0.4	97 (29%)	0.8	17 (5%)	0.6
	Not married (n = 151)	38 (25%)	57 (38%)		45 (30%)		11 (7%)	
Place of residence	Rural area (n = 118)	25 (21%)	37 (31%)	0.3	26 (22%)	0.04	8 (7%)	0.6
	Urban area (n = 368)	81 (22%)	136 (37%)		118 (32%)		18 (5%)	
Previous MI	No history (n = 318)	64 (20%)	111 (35%)	0.8	86 (27%)	0.4	19 (6%)	0.4
	History of MI (n = 168)	40 (24%)	60 (36%)		52 (31%)		7 (4%)	

GP – general practitioner, MI – myocardial infarction.

physicians as the most valuable source of knowledge (Figure 2). Healthcare professionals were indicated as the most preferable source of education regardless of the sociodemographic or clinical factors. A comparison of preferred forms of education is presented in Table IV.

## Discussion

This study demonstrated that regardless of socio-demographic and clinical factors, patients perceive doctors as the most reliable and trusted source of knowledge. Thus, the crucial role of medical doctors in the education of patients should be emphasized. Our results are in line with previous studies [11, 17]. Patients preferred to visit cardiologists rather than general practitioner (GPs). Similar results were re-

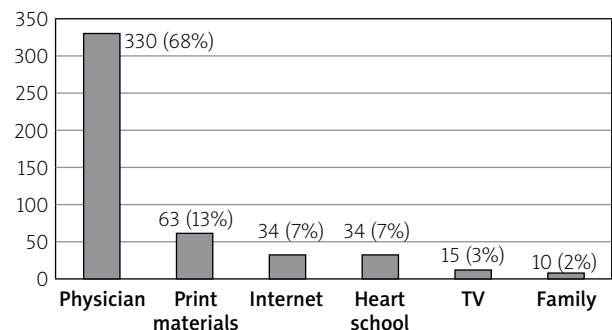
ported in the SHAPE study based on populations from Poland and Romania, whereas in the United Kingdom, Sweden, the Netherlands, France, and Germany, more respondents would go to their GP [11]. Furthermore, responders with CAD were educated more often by a cardiologist, but they used internet sources less often. A possible explanation for this observation could be that most patients are elderly, and they prefer personal contact with physicians than searching for information on the internet. Furthermore, older people are less familiar with computer and internet use. Nevertheless, the fact that people over 65 years old also use the internet cannot be ignored. In our study, it was 23%; thus this way of education should be more extensively used. Alarming-

**Table III.** Comparison of the popularity of particular internet sources of knowledge in groups according to sociodemographic and clinical factors

Variable	Recommended website	P-value	Social media	P-value	Forums	P-value
All respondents (n = 286)	83 (29%)	–	69 (24%)	–	54 (19%)	–
Age	< 65 years (n = 53)	17 (32%)	13 (25%)	0.3	13 (25%)	0.4
	≥ 65 years (n = 127)	30 (24%)	28 (22%)	0.7	24 (19%)	0.4
Education	Primary, secondary, vocational (n = 163)	43 (27%)	37 (23%)	0.2	28 (17%)	0.4
	Higher (n = 68)	24 (35%)	18 (26%)	0.5	15 (22%)	0.4
Place of residence	Rural area (n = 51)	15 (30%)	9 (18%)	0.9	9 (18%)	0.8
	Urban area (n = 179)	52 (29%)	45 (25%)	0.3	34 (19%)	0.8
History of CAD	No CAD in history (n = 94)	26 (28%)	28 (30%)	0.9	22 (23%)	0.06
	History of CAD (n = 113)	31 (27%)	25 (22%)	0.2	15 (13%)	0.06

CAD – coronary artery disease.

ly, for many patients, the preferable form of internet knowledge sources is forums, which are considered as an unreliable source of knowledge. This highlights the crucial role of a doctor in educating the patients, which includes directing them to reliable websites. Clinicians should be aware of patients being misled by erroneous or commercially biased online content. Physicians should be able to redirect their patients to more robust, up-to-date sources [18, 19]. However, elderly people looking for information prefer printed material, verbal media, and physicians [19]. Interestingly, our study showed that patients with higher levels of education were more likely to use books and internet sources, but they relied less on education provided by cardiologists. It might suggest that they more often seek information on their own and consequently rely less on education provided by professionals. This might lead to incorrect conclusions if patients use sources incompatible with medical

**Figure 2.** Currently used sources of knowledge reported as the most valuable. Data presented as number (percentage),  $p = 0.001$ 

knowledge. Therefore, perhaps the solution is to recommend reliable books and websites by doctors. Patients with a history of previous PCI mainly used the care of a cardiologist, but they also preferred televi-

**Table IV.** Preferred forms of education in groups according to sociodemographic profile

Variable	Meetings with health care professionals	P-value	Books	P-value	TV	P-value	Internet	P-value
All patients (n = 486)	320 (66%)	–	180 (37%)	–	97 (20%)	–	107 (22%)	–
Gender	Male (n = 270)	178 (66%)	103 (38%)	1.0	46 (17%)	0.1	76 (28%)	0.02
	Female (n = 216)	142 (66%)	76 (35%)	0.5	52 (24%)	0.1	35 (16%)	0.02
Age	< 65 years (n = 167)	112 (67%)	72 (43%)	0.9	30 (18%)	0.7	48 (29%)	0.08
	≥ 65 years (n = 319)	214 (67%)	115 (36%)	0.2	64 (20%)	0.7	54 (17%)	0.08
Education	Primary, secondary or vocational (n = 359)	240 (67%)	122 (34%)	0.9	61 (17%)	0.02	72 (20%)	0.6
	Higher (n = 127)	84 (66%)	53 (42%)	0.2	36 (28%)	0.02	29 (23%)	0.6
Marital status	Married (n = 335)	224 (67%)	131 (39%)	0.7	67 (20%)	0.6	70 (21%)	0.6
	Not married (n = 151)	98 (65%)	50 (33%)	0.3	33 (22%)	0.6	34 (23%)	0.6
Place of residence	Rural area (n = 118)	77 (65%)	46 (39%)	0.7	21 (18%)	0.5	27 (23%)	0.8
	Urban area (n = 368)	247 (67%)	132 (36%)	0.6	77 (21%)	0.5	77 (21%)	0.8
Previous MI	No history (n = 318)	213 (67%)	114 (36%)	1.0	67 (21%)	0.4	64 (20%)	0.3
	History of MI (n = 168)	109 (65%)	62 (37%)	1.0	29 (17%)	0.4	44 (26%)	0.3

MI – myocardial infarction.

sion programs. Generally, patients' knowledge about cardiovascular prevention is insufficient and patients have poor knowledge and awareness of their CAD risk regardless of the history of revascularization [8, 9, 11, 19–21]. Most commonly older, male patients and people with risk factors of developing CAD, lower socioeconomic status, with lower education level, are more likely to have scarce knowledge about cardiovascular prevention [9, 22]. It is important to emphasize the fact that knowledge does not reduce risk factors of CAD by itself [23, 24]. It is only the first step to make people aware of the impact of adverse factors on the development and/or progression of CVD and the impact on both quality and life expectancy. In effect, patients should change their habits to improve health behaviors [9, 11, 21, 22, 25, 26]. To achieve this, it may be helpful to include spouses and other relatives in the educational process [27], as they can provide support in changing towards a more healthy lifestyle. In our study, 29% of respondents declared that they used the help of the family to comply with medical recommendations. Moreover, an interesting idea is participation in the Patient's Club, which has shown significant benefits in terms of healthy lifestyle changes and more recommended management of cardiovascular risk factors [15]. More efficient education programs and educational materials should be provided to the population. Our study demonstrated experience from a large unselected cohort of Polish patients with CVD. Thus, it might reflect general trends in the level of knowledge about CVD prevention among the population in Poland. More comprehensive and personalized educational programs might improve the effectiveness of education and patients' compliance [28]. It is important to underline the necessity of education provided by doctors as the most reliable and most preferred source of knowledge.

The study should be interpreted in light of several limitations. Our study is based on a single-center experience with a relatively small sample size. Furthermore, there is a potential selection bias. Participants of the First Cardiologists' Congress were probably more interested in health issues, with more knowledge than other patients. A potential limitation is inclusion of patients without CAD. Despite diagnosis of other cardiovascular diseases, they might not receive knowledge about cardiovascular prevention. Furthermore, the questionnaire used in the assessment of patients' knowledge and risk control levels was not validated. However, there is a lack of standardized tools for such assessment. The more studies are conducted, the better standardized questionnaires might be developed in the future.

## Conclusions

Patients perceive physicians as the most reliable and trusted source of knowledge, regardless of socio-demographic and clinical factors. The principal findings were that patients with higher education more often obtain their knowledge from books and the internet, whereas patients with lower levels of education more often relied on their cardiologist for their knowledge. More comprehensive and personalized educational programs might improve the effectiveness of education and patients' compliance.

## Conflict of interest

The authors declare no conflict of interest.

## References

1. Wilkins E, Wilson L, Wickramasinghe K, et al. European Cardiovascular Disease Statistics 2017. Brussels, European Heart Network 2017; 11-6.
2. Kleczyński P, Siudak Z, Dziewierz A, et al. The network of invasive cardiology facilities in Poland in 2016 (data from the ORPKI Polish National Registry). *Kardiologia Polska* 2018; 76: 805-7.
3. Siudak Z, Dudek D, Grygier M, et al. Interventional cardiology in Poland in 2020 – impact of the COVID-19 pandemic. Annual summary report of the Association of Cardiovascular Interventions of the Polish Cardiac Society and Jagiellonian University Medical College. *Adv Interv Cardiol* 2021; 17: 131-4.
4. Hajar R. Risk factors for coronary artery disease: historical perspectives. *Heart Views* 2017; 18: 109-14.
5. Brown JB, Clark AM, Dalal H, et al. Effect of patient education in the management of coronary heart disease: a systematic review and meta-analysis of randomized controlled trials. *Eur J Prev Cardiol* 2013; 20: 701-14.
6. Clark AM, Hartling L, Vandermeer B, et al. Meta-analysis: secondary prevention programs for patients with coronary artery disease. *Ann Intern Med* 2005; 143: 659-72.
7. Siudak Z, Dziewierz A, Rakowski T, et al. Borderline trend towards long-term mortality benefit from drug eluting stents implantation in ST-elevation myocardial infarction patients in Poland-data from NRDES registry. *Catheter Cardiovasc Interv* 2014; 83: 436-42.
8. Slark J, Bentley P, Majeed A, et al. Awareness of stroke symptomatology and cardiovascular risk factors amongst stroke survivors. *J Stroke Cerebrovasc Dis* 2012; 21: 358-62.
9. Kilkenny MF, Dunstan L, Busingye D, et al. Knowledge of risk factors for diabetes or cardiovascular disease (CVD) is poor among individuals with risk factors for CVD. *PLoS One* 2017; 12: e0172941.
10. Baumann G, Stangl V, Grohmann A, et al. What do German citizens know about cardiovascular emergencies? Results of a survey conducted among 2000 Germans concerning coronary risk factors, symptom complexes of angina pectoris and acute myocardial infarction. *Intensivmed* 2003; 40: 590.
11. Remme WJ, McMurray JJ, Rauch B, et al. Public awareness of heart failure in Europe: first results from SHAPE. *Eur Heart J* 2005; 26: 2413-21.
12. Griffo R, Ambrosetti M, Tramarin R, et al. Effective secondary prevention through cardiac rehabilitation after coronary

- revascularization and predictors of poor adherence to lifestyle modification and medication. Results of the ICAROS Survey. *Int J Cardiol* 2013; 167: 1390-5.
13. Redfern J, Briffa T, Ellis E, et al. Choice of secondary prevention improves risk factors after acute coronary syndrome: 1-year follow-up of the CHOICE (Choice of Health Options In prevention of Cardiovascular Events) randomised controlled trial. *Heart* 2009; 95: 468-75.
  14. Siudak Z, Krawczyk-Ożóg A, Twarda I, et al. "Heart without smoke" educational campaign – the role of patient education in secondary prevention of cardiovascular disease. *Kardiol Pol* 2018; 76: 125-9.
  15. Siudak Z, Pers M, Dusza K, et al. The efficacy of an education-based secondary outpatient prevention programme after acute coronary syndrome hospitalizations and treatment in Poland. The Patient Club initiative. *Kardiol Pol* 2016; 74: 185-91.
  16. Ogólnopolski program profilaktyki w zakresie miażdżycy tętnic i chorób serca poprzez edukację osób z podwyższonymi czynnikami ryzyka sercowo-naczyniowego. Available online: <https://programkordian.pl/> (accessed on 25 March 2022).
  17. Lainscak M, Letonja M, Kovacic D, et al. General public awareness of heart failure: results of questionnaire survey during Heart Failure Awareness Day 2011. *Arch Med Sci* 2014; 10: 355-60.
  18. Kirthi V, Modi BN. Coronary angioplasty and the internet: what can patients searching online expect to find? *J Interv Cardiol* 2012; 25: 476-81.
  19. Zelenak C, Radenovic S, Musial-Bright L, et al. Heart failure awareness survey in Germany: general knowledge on heart failure remains poor. *ESC Heart Fail* 2017; 4: 224-31.
  20. Wójcicki K, Krycińska R, Tokarek T, et al. Knowledge and prevalence of risk factors for coronary artery disease in patients after the first and repeated percutaneous coronary intervention. *Kardiol Pol* 2020; 78: 147-53.
  21. Störk S, Kavoliuniene A, Vinereanu D, et al. What does the lay public know about heart failure? Findings from the Heart Failure Awareness Day Initiative [published correction appears in *Eur J Heart Fail*. 2016 Feb;18(2):217]. *Eur J Heart Fail* 2016; 18: 66-70.
  22. Peterson PN, Shetterly SM, Clarke CL, et al. Health literacy and outcomes among patients with heart failure. *JAMA* 2011; 305: 1695-701.
  23. Stawska A, Siudak Z. Nurse-managed education: the effectiveness of secondary prevention after acute coronary syndromes and the prevalence and predictors of dropout from a cardiac rehabilitation programme. *Adv Interv Cardiol* 2021; 17: 46-53.
  24. Kozieł P, Jankowski P, Surowiec S, et al. Temporal changes in the secondary prevention of coronary artery disease in patients following myocardial revascularization. *Adv Interv Cardiol* 2020; 16: 422-8.
  25. Berkman ND, Sheridan SL, Donahue KE, et al. Low health literacy and health outcomes: an updated systematic review. *Ann Intern Med* 2011; 155: 97-107.
  26. Lorig KR, Sobel DS, Ritter PL, et al. Effect of a self-management program on patients with chronic disease. *Eff Clin Pract* 2001; 4: 256-62.
  27. Genz CA. Perceived learning needs of the patient undergoing coronary angioplasty: an integrate review of the literature. *Heart and lung. J Acute Critical Care* 2000; 29: 161-72.
  28. Visseren FLJ, Mach F, Smulders YM, et al. ESC Scientific Document Group 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur J Prev Cardiol* 2022; 29: 5-115.