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Smoking cessation in European patients with coronary heart disease. Results from the EUROASPIRE IV survey: A registry from the European Society of Cardiology

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ABSTRACT

Objective: We investigated smoking cessation rates in coronary heart disease (CHD) patients throughout Europe; current and as compared to earlier EUROASPIRE surveys, and we studied characteristics of successful quitters.
Methods: Analyses were done on 7998 patients from the EUROASPIRE-IV survey admitted for myocardial infarction, unstable angina and coronary revascularisation. Self-reported smoking status was validated by measuring carbon monoxide in exhaled air.
Results: Thirty-one percent of the patients reported being a smoker in the month preceding hospital admission for the recruiting event, varying from 15% in centres from Finland to 57% from centres in Cyprus. Smoking rates at the interview were also highly variable, ranging from 7% to 28%.
The proportion of successful quitters was relatively low in centres with a low number of pre- event smokers.
Overall, successful smoking cessation was associated with increasing age (OR 1.50; 95% CI 1.09–2.06) and higher levels of education (OR 1.38; 95% CI 1.08–1.75).
Successful quitters more frequently reported that they had been advised (56% vs. 47%, $p < .001$) and to attend (81% vs. 75%, $p < .01$) a cardiac rehabilitation programme.
Conclusion: Our study shows wide variation in cessation rates in a large contemporary European survey of CHD patients. Therefore, smoking cessation rates in patients with a CHD event should be interpreted in the light of pre-event smoking prevalence, and caution is needed when comparing cessation rates across Europe.
Furthermore, we found that successful quitters reported more actions to make healthy lifestyle changes, including participating in a cardiac rehabilitation programme, as compared with persistent smokers.
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1. Background

Smoking is the most important modifiable risk factor for coronary heart disease (CHD) and a leading cause of death [1]. In patients with CHD, smoking cessation reduces the risk of recurrent events by 50% [2]. However, only half of smokers with CHD in Europe were able to successfully quit smoking [3,4].

The European guidelines on cardiovascular prevention in clinical practice recommend a comprehensive approach to risk factor management in secondary prevention of CHD [5].

Optimal secondary prevention includes lifestyle modification, treatment to target for biometric risk factors, such as blood pressure and low-density lipoprotein cholesterol (LDL) and no exposure to tobacco in any form [5]. To evaluate the implementation of these guidelines in clinical practice, the EUROASPIRE (European Action on Secondary and Primary Prevention by Intervention to Reduce Events) repeated cross-sectional, surveys have been conducted, EUROASPIRE IV performed in 2012–1013. In the current analysis, we focussed on smoking cessation rates throughout Europe; drawing on data from EUROASPIRE IV and the earlier surveys. Furthermore, we aimed to investigate the characteristics of successful quitters, the use cardiac rehabilitation programmes,

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and the level of general risk factor management in persistent smokers versus in those who successfully quit smoking.

2. Methods

2.1. Design and study population

The four EUROASPIRE surveys are cross-sectional studies which took place between 1999 and 2013 and have been described in detail elsewhere [3]. Briefly, the EUROASPIRE IV survey (2012–2013) was carried out in selected geographical areas in 24 European countries (78 hospitals). Consecutive patients (≥18 years and ≤80 years of age at the time of their recruiting event or procedure) were retrospectively identified with one of the following diagnoses: elective or emergency coronary artery bypass graft (CABG), elective or emergency percutaneous coronary intervention (PCI), acute myocardial infarction, and acute myocardial ischaemia. The local research ethics committee of all recruiting hospitals gave permission for the study. The medical records of 16,426 CHD patients were reviewed and 7998 (48.7%) of them accepted the invitation for the interview and were examined in the period of 6 months to 3 years following hospital discharge for the recruiting event. On average, EUROASPIRE IV patients were interviewed after 1.4 (0.95–1.95) years. Thirty-five patients reported not to smoke in the month prior to the recruiting event, but presented an expired carbon monoxide concentration >10 p.p.m. at the time of interview. These smokers were not included in our pre-event smokers analyses. Appendix Fig. 1 shows the study flowchart.

2.2. Assessment of smoking behaviour

Information on smoking behaviour was collected using an interview questionnaire. Patients were asked if they had ever smoked, if they were smoking in the month prior to hospital admission for the recruiting event, or if they were current smokers. Smoking status was verified by the concentration of breath carbon monoxide using a smoker analyser (Bedfont Scientific, Model Micro+). Interview questions contained items concerning lifestyle risk factor targets and awareness and steps taken since the recruiting event or procedure. EUROASPIRE II-IV data were used for the evaluation of smoking cessation over time. Therapeutic targets for secondary prevention were defined according to the ESC guidelines on secondary prevention (2007 and 2012) [6,7].

We defined successful quitters as pre-event smokers who reported a non-smoking status at the time of interview and an expired carbon monoxide concentration ≤10 p.p.m. We defined persistent smokers as pre- event smokers who at the time of interview reported that they were currently smoking *or* had an expired carbon monoxide concentration >10 p.p.m. Relapsers were defined as patients who had a quit attempt in the last year for at least 24 h, but were smoking at the time of interview.

2.3. Statistical methods

Data on smoking behaviour prior to the recruiting event and at the time of the interview are presented as absolute numbers and percentages, and stratified by country. We calculated cessation rates of the number of pre- event smokers versus successful quitters, overall and per country. Countries were stratified as above (high) or below (low) mean European pre- event smoking rate (>30%) and above (high) or below (low) mean European cessation rate (>50%). Hospital readmissions were reported between recruiting event and date of interview. Further data are presented as number (percentage) or mean (±standard deviation), or median (interquartile range (IQR), 25th–75th) as appropriate. Dichotomous variables were analysed using χ^2 or Fisher's exact tests, continuous normally distributed variables using independent samples *t*-tests. We analysed a broad range of clinical and demographic characteristics to evaluate the relation with smoking cessation based on the model used in the analysis of Scholte op Reimer et al. [8](EUROASPIRE II), using multivariable logistic regression analyses adjusted for age, gender, and country of enrolment where appropriate. Adjusted odds ratios and corresponding 95% confidence intervals (95% CI) are reported. Most data items that entered the regression models were determined at the interview, simultaneously with the patient's smoking behaviour. Statistical significance was concluded when p-values were not reaching the $\alpha = 0.05$ probability level. Statistical analyses were performed using SPSS version 23.0 (IBM SPSS Statistics, IBM Corporation, Armonk, New York).

3. Results

Information on smoking status was available in all interviewed patients (n = 7998). A total of 2458 (31%) patients were smoking in the month prior to the recruiting event or procedure. Of n = 2458 pre-event smokers, 1263 (51%) were successful quitters at the time of the interview (median 1.2 years [range 0.5 to 3 years]) (Appendix Fig. 1). Of 1195 (49%) persistent smokers, 593 reported at least one quit attempt in the last year (relapsers).

Smoking rates differed markedly among the participating countries (Table 1). The pre- event smoking rates varied from 15% (Finland) to 57% (Cyprus). Smoking rates at the interview were also highly variable, ranging from 7% (Finland and Belgium) to 28% (Cyprus).

When stratifying individual countries as above (high) or below (low) mean European pre- event smoking rates and above (high) or below (low) mean European cessation rates, we observed considerable variation between countries. We observed four country groups: 1) high pre-event smoking prevalence, low quit rate (mean 0.45); 2) high pre-event smoking prevalence, high quit rate (mean 0.68); 3) low pre-event smoking prevalence, low quit rate (mean 0.45); 4) low pre-event smoking prevalence, high quit rate (mean 0.55). The two groups of countries with high pre-event smoking prevalences differed in mean quit rates (high-low 0.45 vs. high-high 0.68, p < .001). The two

Table 1
Smoking prevalence in EUROASPIRE IV according to country of enrolment in 7998 patients at the time of interview.

Country	Number of interviewed patients	Number of patients who ever smoked (%)	Number of pre-event smokers (%)	Number of current smokers (%)	Quit rate
Belgium	343	238 (69%)	67 (20%)	26 (8%)	0.61
Bosnia Herzegovina	316	190 (60%)	133 (42%)	45 (14%)	0.66
Bulgaria	120	84 (70%)	35 (29%)	21 (18%)	0.40
Croatia	467	306 (66%)	140 (30%)	77 (16%)	0.45
Cyprus	90	73 (81%)	51 (57%)	24 (27%)	0.53
Czech Republic	490	342 (70%)	162 (33%)	84 (17%)	0.48
Finland	464	242 (49%)	58 (15%)	31 (7%)	0.47
France	377	288 (76%)	133 (35%)	94 (25%)	0.29
Germany	536	354 (66%)	100 (19%)	52 (10%)	0.47
Greece	51	36 (71%)	19 (37%)	10 (20%)	0.47
Ireland	201	158 (79%)	66 (33%)	33 (16%)	0.50
Latvia	294	143 (49%)	75 (26%)	36 (12%)	0.52
Lithuania	499	290 (58%)	164 (33%)	86 (17%)	0.48
Netherlands	498	378 (76%)	146 (29%)	73 (15%)	0.50
Poland	377	273 (72%)	137 (36%)	71 (19%)	0.48
Romania	522	340 (65%)	195 (37%)	58 (11%)	0.70
Russian Federation	424	266 (58%)	138 (33%)	89 (21%)	0.36
Serbia	391	296 (76%)	181 (46%)	68 (17%)	0.62
Slovenia	245	158 (64%)	54 (22%)	24 (10%)	0.55
Spain	173	139 (80%)	71 (41%)	19 (11%)	0.73
Sweden	359	265 (74%)	98 (28%)	49 (14%)	0.50
Turkey	239	170 (71%)	100 (42%)	53 (22%)	0.47
Ukraine	274	149 (54%)	76 (28%)	36 (13%)	0.53
United Kingdom	248	146 (59%)	59 (24%)	36 (15%)	0.39
All patients	7998	5324 (67%)	2458 (31%)	1195 (16%)	0.51

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