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Smoking cessation as secondary prevention for patients with coronary artery disease.

Stoppen met roken als secundaire preventie voor patiënten met coronarialijden.

Proefschrift

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To cease smoking is the easiest thing I ever did;
I ought to know because I have done it a thousand times.

Mark Twain

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Contents

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Introduction

Chapter 1

Effect of smoking

In the last decades, extensive research has demonstrated that smoking causes many diseases and premature death. The famous British Doctors' Study[1] showed in a 40 years follow-up survey a significant association of smoking with twenty-four diseases. The overall mortality rate was almost twice as great in smokers as in life-long non-smokers (Risk Ratio 1.8, 95% confidence interval 1.7 to 1.9, Table 1). Accordingly, smokers had an 8 years shorter median survival than non-smokers.

Table 1 Mortality by smoking habits (annual mortality per 100,000 men)

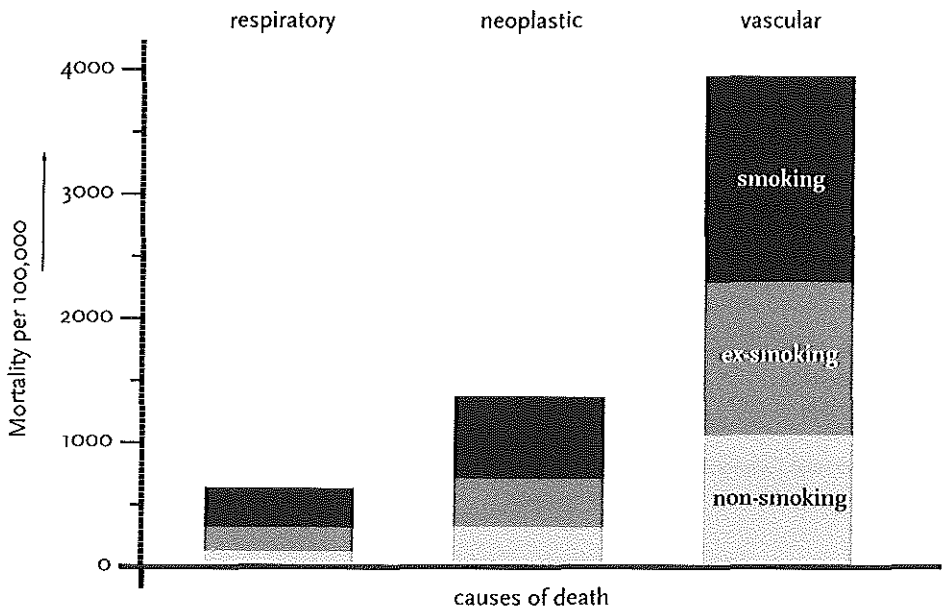
Type of disease	non smoking	ex smoking	smoking	RR *	95%	CI
Vascular						
Ischaemic heart disease	572	678	892	1.6	1.4	- 1.7
Arteriosclerosis	22	18	40	1.8	1.1	- 3.1
Hypertension	32	33	44	1.4	0.9	- 2.2
CVA	152	158	203	1.3	1.1	- 1.6
Subaracchnoid haemorrhage	7	10	15	2.1	0.9	- 5.3
All vascular diseases	1,037	1,221	1,643	1.6	1.5	- 1.7
Respiratory						
COPD	10	57	127	12.7	6.7	- 24.2
All respiratory diseases	107	192	313	2.9	2.3	- 3.6
Neoplastic						
Upper respiratory	1	3	24	24.0	3.2	- 177.4
Lung	14	58	209	14.9	8.7	- 25.6
Oesophagus	4	16	30	7.5	2.6	- 21.3
Pancreas	16	23	30	1.9	1.0	- 3.4
Bladder	13	21	30	2.3	1.2	- 4.4
Stomach	26	25	43	1.7	1.0	- 2.7
All neoplastic diseases	305	384	656	2.2	1.9	- 2.5
All causes of death	1,706	2,113	3,038	1.8	1.7	- 1.9

* *Risk Ratio smoking vs. non-smoking (adapted from Doll et al., 1994)*

The risk ratios showed a consistent pattern: all disease ratios were positively related with smoking. Chronic obstructive pulmonary disease and cancer of the respiratory system are highly correlated with smoking. The overall calculated risk ratio of ischaemic heart disease in smokers compared to non-smokers was 1.6. A higher risk ratio was found in middle aged (< 65 years: 2.1) compared to older age (> 80 years: 1.2). Thus, smoking causes premature ischaemic heart disease, which is most profound at young age.In absolute numbers, cardiovascular diseases are the most frequent cause of mortality, and smoking related death is particularly related to vascular disease (heart disease and stroke, Figure 1).

Cardiovascular diseases are the main cause of mortality. In the Netherlands, over 50.000 persons (37%) die of cardiovascular diseases each year.[2]

Figure 1 Mortality per major disease group. (Adapted from Doll et al., 1994)



Moreover, ischaemic hart disease causes almost 100,000 hospital admissions each year.[3] In 1995, 27% of the vascular deaths in men aged 35-69 could be attributed to smoking. In women of the same age, this percentage was 16%. In men and women of 70 years or older, the percentages were 18% and 2% respectively.[4] In 1997, 22,926 (49%) people died in the Netherlands because of four major diseases associated with their smoking habits; 6,096 (31%) coronary deaths were caused by smoking.[5]

Smoking figures

In Europe, smoking percentages range from 23% in Norway and Finland, comparable to the United Stated of America and Australia, to almost 50% in Turkey and Russia (Figure 2).[6]

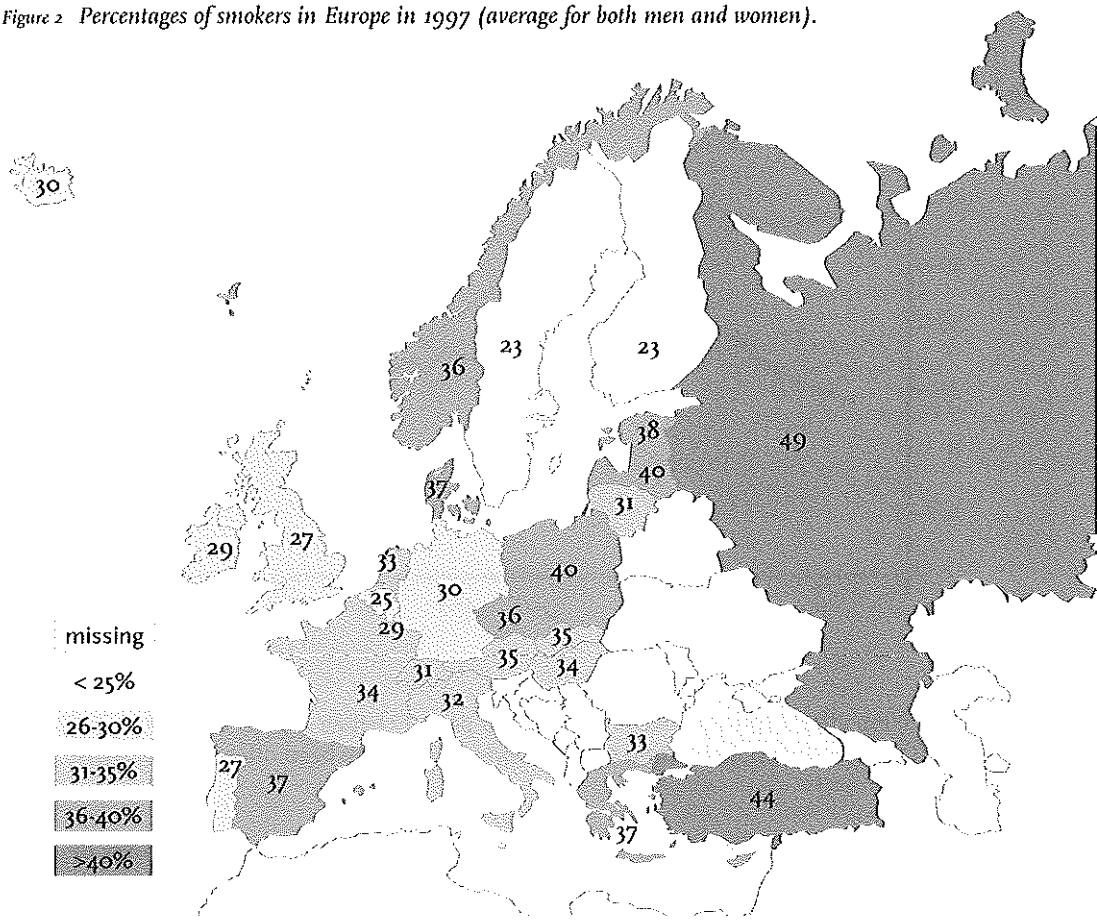
In 1998, 34% of the Dutch population smoked (30% of the women and 37% of the men, Figure 3). The percentage smokers in the Netherlands has decreased considerably during the second half of the last century, but since the eighties it has been rather stable. Approximately one fifth of the Dutch smokers made an attempt to quit in 1998. About four fifths of these smokers had relapsed within 12 months. Of those who made a successful attempt, 74% did not use any aids to stop smoking.[7]

Perspectives of costs

In view of the enormous increase in health costs, it is to be expected that more effort is invested in (secondary) prevention, particularly in decreasing tobacco use. In the Netherlands, only 2% of the health care budget (60 billion guilders in 1999) is spent

on prevention.[2] Also, compared to money spent on drugs and invasive procedures, health promotion and education plays a minor role in public health.

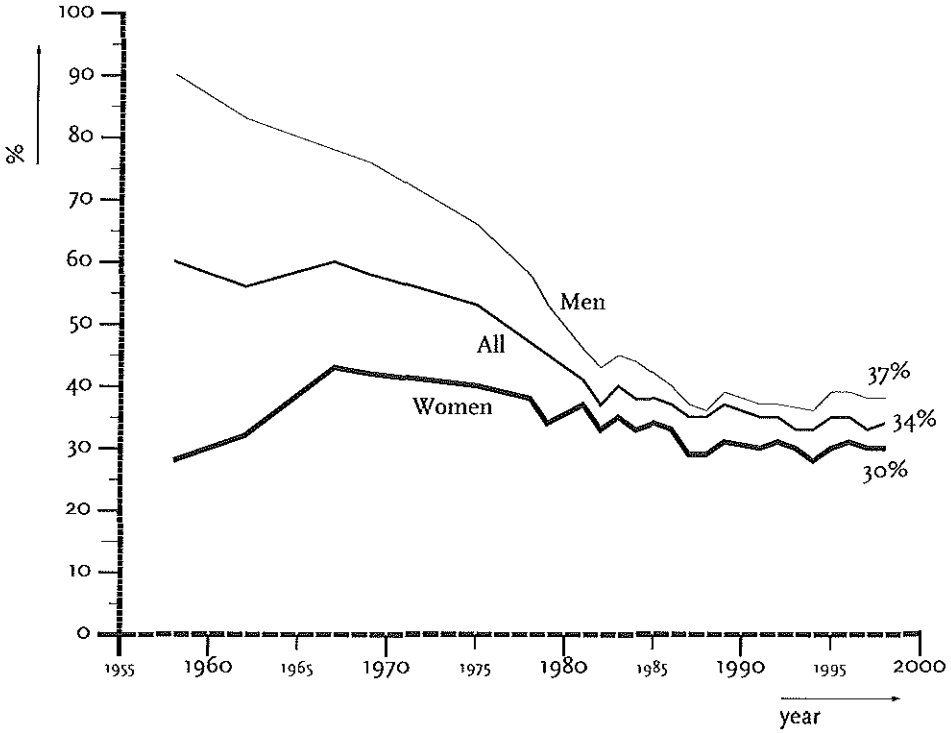
Figure 2 *Percentages of smokers in Europe in 1997 (average for both men and women).*



The Dutch Foundation on Smoking and Health had in 1998 a budget of only 9 million guilders.[7] In contrast, as illustration, 600 million guilders are spent on lipid-lowering drugs in the Netherlands.[8] Drugs used to stop smoking, such as nicotine replacement therapy and bupropion, are not reimbursed in the Netherlands. It is very difficult to obtain accurate figures on how much the tobacco industry spends on advertising in the Netherlands. In 1993, approximately 6 billion dollars were spent worldwide on marketing of tobacco.[9]

Beneficial changes in the coronary risk profile can improve prognosis in patients with already established coronary artery disease. *Chapter 2* describes the favourable effect of smoking cessation with regards to mortality and myocardial (re)infarction in coronary patients. However, these outcomes do not result in smoking cessation by all patients who suffered a coronary event. At least half of the patients continue or relapse

Figure 3 *Percentages of smokers in the Netherlands.*



in smoking after a coronary event. The second part of chapter 2 gives an overview of the efficacy of smoking cessation interventions, which have been offered to coronary patients.

Chapter 3 describes the effect of smoking cessation in a particular subgroup of coronary patients: those who underwent a coronary bypass operation. This major coronary event is expected to have an enormous impact in patients' smoking behaviour as well as other changes in lifestyle.

The current management of smoking by cardiologists is described in *Chapter 4*. The extent of registration, advice to stop smoking, referral to additional smoking cessation support or counselling, and the effect on the actual smoking cessation of coronary patients was investigated in nine European countries.

In order to address assistance in smoking cessation to those, who would benefit most, predictors of smoking cessation were investigated. *Chapter 5* deals with demographic, clinical and psychological predictors of long-term smoking cessation in patients who suffered a myocardial infarction.

Most published studies on smoking cessation interventions for cardiac patients are executed on the cardiology wards. *Chapter 6* describes a smoking cessation

intervention offered to coronary patients in an outpatient setting. In this intervention, two different tools were utilised. A 'minimal intervention strategy' offered by nurses, and a tailored letter, adjusted to the patients' individual situation.

The results of the intervention described in chapter 6 are discussed in *Chapter 7*. Furthermore, predictors of smoking cessation were investigated, in order to detect which patients are helped by this intervention program and for whom other means of support should be explored.

Results of the previous chapters are discussed in *Chapter 8*. Furthermore, additional subjects, which were not described in the previous chapters, such as costs of smoking cessation interventions, are reflected upon recommendations for future smoking cessation programs are given, and implications for future practice and new research areas are delineated.

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Impact of smoking cessation and smoking interventions in patients with coronary heart disease.

Chapter 2

A systematic review.

Summary

Aims The overwhelming evidence that smoking causes cardiovascular disease and new events in patients with CHD justifies the promotion of smoking cessation. This article gives a review of the observational studies on the effect of smoking cessation in patients with coronary heart disease as well as of smoking cessation interventions that have been offered to cardiac patients.

Methods A Medline search for English language papers from 1966 until 1998 eventuated in nineteen observational studies exploring the effect of smoking cessation in coronary patients. Furthermore, nine studies on smoking cessation interventions for patients with established coronary heart disease were published.

Results Mortality or non-fatal myocardial infarction declines with an average of 35%. The relative risk of mortality after the coronary event compared to persistent smokers ranged from 0.13 to 0.72, while the relative risk of death or myocardial infarction ranged from 0.23 to 0.68. In trials of smoking cessation programs in coronary heart disease patients, 20% more patients quitted smoking after being subjected to a special smoking cessation program as compared to those in the usual care.

Conclusion This systematic review of observational studies on the impact of smoking cessation on the prognosis of coronary heart disease patients confirms that this lifestyle change is one of the most powerful measures in reducing mortality and recurrent coronary events. Special smoking cessation programs improve the success in quitting smoking.

Introduction

Although it is well known that smoking is strongly associated with coronary heart disease,[1,2] many patients continue or resume smoking after being diagnosed with coronary heart disease (CHD) and even after an important event such as a myocardial infarction, angioplasty or coronary bypass surgery. The evidence that smoking causes cardiovascular disease and new events in patients with coronary heart disease, among other serious disorders such as lung cancer and emphysema, justifies the promotion of smoking cessation. All recommendations on the prevention of coronary heart disease emphasise the importance of smoking cessation in the reduction of the risk of coronary death and non-fatal coronary events.[3,4] The recent EUROASPIRE study on the status of secondary prevention of coronary heart disease in nine European countries has shown, however, that success in smoking cessation among coronary heart disease patients is far from satisfactory.[5] In this era of evidence-based medicine, information from systematic reviews of published studies should guide physicians and other health professionals advising patients in smoking cessation. With this in mind, we have carried out a systematic review of published observational studies on the impact of smoking cessation on the prognosis, and on smoking intervention trials in patients with coronary heart disease.

Methods

A Medline search for English language papers from 1966 until the beginning of 1999 was performed by the first author, using the keywords: 'coronary disease' or 'myocardial infarction' or 'angina pectoris' or 'angiography' or 'coronary artery bypass' or balloon angioplasty' (about 200,000 hits) and 'smoking (restricted to focus)' or 'smoking cessation (restricted to focus)' (about 25,000 hits), which produced a list of 1,191 publications. All these publications were screened; reading titles and, if appropriate, abstracts. All articles about mortality and myocardial (re-) infarction in patients with coronary heart disease and smoking cessation after a cardiac event were selected, supplemented with references regarding occurrence of myocardial infarction and mortality in coronary patients after smoking cessation, which yielded 19 publications. Furthermore, all publications on smoking cessation interventions used as secondary prevention for coronary patients were selected. Again, related references concerning the effect of smoking cessation interventions in coronary patients were added, eventuating in 10 articles.

For each study comparing quitters and continuing smokers, odds ratios and 95% confidence intervals for mortality alone, and the combined outcome of death and non-fatal myocardial infarction were calculated. Chi square tests were applied to evaluate statistical significance. Subsequently, sequential meta-analyses were performed and odds ratios with 95% confidence intervals were determined based on the combined study data beginning with the oldest; subsequent studies were added step by step in chronological order.

Results

Impact of smoking cessation on prognosis

Tables 1 and 2 review of 19 observational studies, exploring differences in mortality or (re-) infarction between patients who quit or continue smoking after a coronary event.[6-24] Time of publication ranged from 1975 to 1997 (Table 1). Most studies concerned patients after a (first) myocardial infarction. The average age was approximately 56 years. Most studies had an upper age limit ranging from 60 to 67 years, while one study focussed on elderly people with a lower age limit of 55 years.[17] In all studies but one, men were over-represented; in six (early) studies only men were included,[6,7,9-11,19] while in one study only women were enrolled.[14] The average number of smokers at baseline was 53%. A significant decrease can be observed over time, form 71% in the decade 1975-1984 to 33% during 1985-1994. This was in spite of the noted excess of the Japanese study, where smoking prevalence had increased, corresponding with overall smoking rates in Japan.[19]

Duration of follow-up ranged from 1-13 years. Definitions of 'smoking' and 'quitting' varied, while some studies did not clearly specify smoking or quitting. To be designated a 'smoker' in studies in which smoking was defined, patients had to have smoked from one to five cigarettes a day during a period which ranged from 'at baseline' to 'the last two years'. Smoking cessation at follow-up was always self-reported and varied from not smoking for 3 months to 1 year. Prognosis at follow-up (up to 13 years) was, in all cases, related to smoking status determined at one year or earlier after baseline.

The percentage of patients who quit ranged from 28 to 60%, with an average of 49% (Table 2). This percentage decreased from 50% in the decade 1975-1984 to 42% during 1985-1994. The percentages of deaths and, if investigated, non-fatal myocardial (re)infarction of patients who continued smoking were compared with those who had stopped smoking after the coronary event. In all publications, smoking cessation reduced mortality at follow-up. In 10 articles, a significant difference was found in mortality between the two groups: the odds ratio for dying ranging from 0.13 to 0.72 for quitters compared to those who continued smoking. In the other nine articles, most of which had a small number of patients or a shorter follow-up, a similar trend was reported without reaching statistical significance. Twelve articles assessed the occurrence of death or non-fatal myocardial (re-) infarction in the two groups. In nine of these a significant difference was found, the odds ratio ranging from 0.23 to 0.68. With regards to age, smoking cessation also improved prognosis in elderly coronary patients.[10,17]

Multivariate analyses were performed in eleven of the 19 studies. Although the odds ratio increased in most cases, the effect of smoking cessation appeared to be independent. Combining the data of 13,019 smokers, of whom 5,776 (44%) had quit smoking after the event, 1,010 (17%) of the quitters died albeit at different follow-up intervals, compared to 1,838 (25%) in the current smokers: odds ratio 0.62 (95% confidence interval 0.57 to 0.68). Sequential meta-analysis of the nineteen studies

Table 1 *Reviewed articles on prognosis of CHD for coronary patients after smoking cessation.*

Author	Ref	Year	N*	Prevalence of smoking †	Inclusion (years)	Age (years)	% men	FU	baseline 'smoker' Cigarets per day	baseline 'smoker' Duration (months)	follow-up quitter (months)	
Wilhelmsson et al.	4	1975	405	77	1st AMI, discharged alive	< 67	100	2	≥ 1	3	3	post-AMI
Mulcahy et al.	5	1977	190	87	1st UAP/AMI, 28days survival	< 60	100	5	≥ 5	6	≥ 6	post-AMI
Sparrow et al.	6	1978	202	52	1st AMI, discharged alive (Fram)	60	74	6	> 1	≥ 12		post-MI
Salonen	7	1980	535	60	AMI, 6 months survival	< 65	100	3	-	-	<6	post-AMI
Aberg et al.	8	1983	983	78	1st AMI	strat. ◊	100	5	≥ 1	< 3	3	post-AMI
Daly et al.	9	1983	374	74	1st AMI/UAP, 2 year survival	< 60	100	13	≥ 5	< 6	≥ 3	post-AMI
Rønnevik et al.	10	1985	919	53	AMI, timolol-trial	-	79	1	cont.~	-	1	post-AMI
Perkins et al.	11	1985	119	60	AMI, 1 month survival	59 ‡	76	5	1	at baseline		post-AMI
Johansson et al.	12	1985	156	61	1st MI, discharged alive	strat. ◊	0	5	≥ 1	< 3	3	post-AMI
Hallstrom et al.	13	1986	310	57	sudden arrest out-hospital	56 ‡	80	4	-	-	-	
Vlietstra et al.	14	1986	4165	34	CAG: ≥ 1vessel ≥ 50% stenosis	≥ 55	-	5	-	at baseline	< 12	before baseline
Hermanson et al.	15	1988	1893	22	1-v ≥ 50%, no CABG	≥ 55	78	6	-	at baseline	< 12	before baseline
Cavender et al.	16	1992	284	40	CAG ≥ 70% stenosis	≥ 65	90	10	-	at follow-up	6	post-AMI
Sato et al.	17	1992	87	86	AMI	> 30	100	3	-	-		ex-smoker
Gupta et al.	18	1993	225	43	CHD	54 ‡	79	6	> 5	-		since CHD
Herlitz et al.	19	1995	302	37	AMI	70 ∫	69	5	-	-		at follow-up
Greenwood et al.	20	1995	532	44	AMI	-	-	5.5	-	-		at follow-up
Voors et al.	21	1996	169	41	CABG, 30 days survival	53 ‡	90	15	-	at surgery		stopped since surgery
Hasdai et al.	22	1997	1169	22	PTCA	-	-	4.5	-	-	-	

* *Number of patients selected for this study*
† *Percentage of smokers at baseline*
‡ *mean*
∫ *median*
◊ *stratified*
~ *continuously*

Table 2 *Mortality and incidence of coronary events in patients with coronary heart disease who quitted or continued smoking.*

Author	Quitters at follow-up		Mortality quitters		smokers		Univariate OR	Adjusted OR	Mortality + non-fatal MI quitters		smokers		Univariate OR	Adjusted OR
		(%)		(%)		(%)	(95%, CI)	(95% CI)		(%)		(%)	(95% CI)	(95% CI)
Wilhelmson et al.	231	57	15	7	22	13†	0.48 (0.22, 1.01)		35	15	53	30*	0.41 (0.24, 0.68)	
Mulcahy et al.	89	47	13	15	23	23$	0.58 (0.25, 1.30)		-		-			
Sparrow et al.	56	28	10	19	40	30$	0.58 (0.24, 1.30)		18	33	66	49$	0.57 (0.28, 1.15)	
Salonen	221	41	26	12	60	20†	0.56 (0.33, 0.95)	0.63 †,◇	-		-			
Aberg et al.	542	55	97	18	126	29*	0.54 (0.40, 0.74)	0.52 ‡,~	201	37	253	58*	0.44 (0.34, 0.57)	
Daly et al.	217	58	80	37	129	82*	0.13 (0.07, 0.21)		-	-				
Rønnevik et al.	551	60	37	7	29	8$	0.84 (0.49, 1.45)		81	15	74	20†	0.68 (0.43, 0.99)	
Perkins et al.	52	44	9	17	30	45∫	0.26 (0.10, 0.65)	0.44 (0.20, 0.95)†,¶	15	29	32	48†	0.44 (0.19, 1.02)	
Johansson et al.	81	52	14	17	27	36‡	0.37 (0.16, 0.83)	0.37	32	37	48	63$	0.37 (0.18, 0.74)	
Hallstrom et al.	91	29	34	37	104	47$	0.66 (0.39, 1.12)	0.51 $,£	-		-			
Vlietstra et al.	1,490	36	234	16	548	21*	0.72 (0.61, 0.86)	0.57 *	340	23	850	32*	0.63 (0.55, 0.74)	
Hermanson et al.	807	43	210	26	391	36*	0.63 (0.51, 0.77)	0.59 (0.50, 0.71)*	466	58	825	76*	0.43 (0.35, 0.53)	0.67 (0.59, 0.83)*
Cavender et al.	97	34	19	20	58	31†	0.54 (0.28, 1.01)	0.64	-		-			
Sato et al.	60	66	5	9	6	21$	0.34 (0.07, 1.51)		5	9	8	29†	0.23 (0.05, 0.93)	0.32 (0.10, 1.0)†
Gupta et al.	173	77	56	32	24	46$	0.56 (0.28, 1.11)		-		-			
Herlitz et al.	115	53	20	17	58	31‡	0.47 (0.25, 0.85)	$	30	26	67	36$	0.63 (0.36, 1.08)	
Greenwood et al.	396	74	64	16	29	21$	0.76 (0.51, 1.12)	0.56 (0.33, 0.98)	-		-			
Voors et al.	72	43	26	36	37	39$	0.92 (0.46, 1.80)	1.11 (0.63, 2.0)$	37	51	65	67†	0.52 (0.27, 1.02)	
Hasdai et al.	435	37	41	9	97	13$	0.68 (0.45, 1.02)	0.69 (0.47,0.98)	50	11	119	16$	0.67 (0.46, 0.97)	
Total	5,776	44	1,010	17	1,838	25	0.62 (0.57, 0.68)		1,310	23	2,460	34	0.57 (0.53, 0.62)	

† <0.05; ‡ <0.01; ∫ <0.005; * <0.001; $ = not significant

◇ *Stratification for age, previous MI/AP, heart failure/arrest*

~ *Stratification for age*

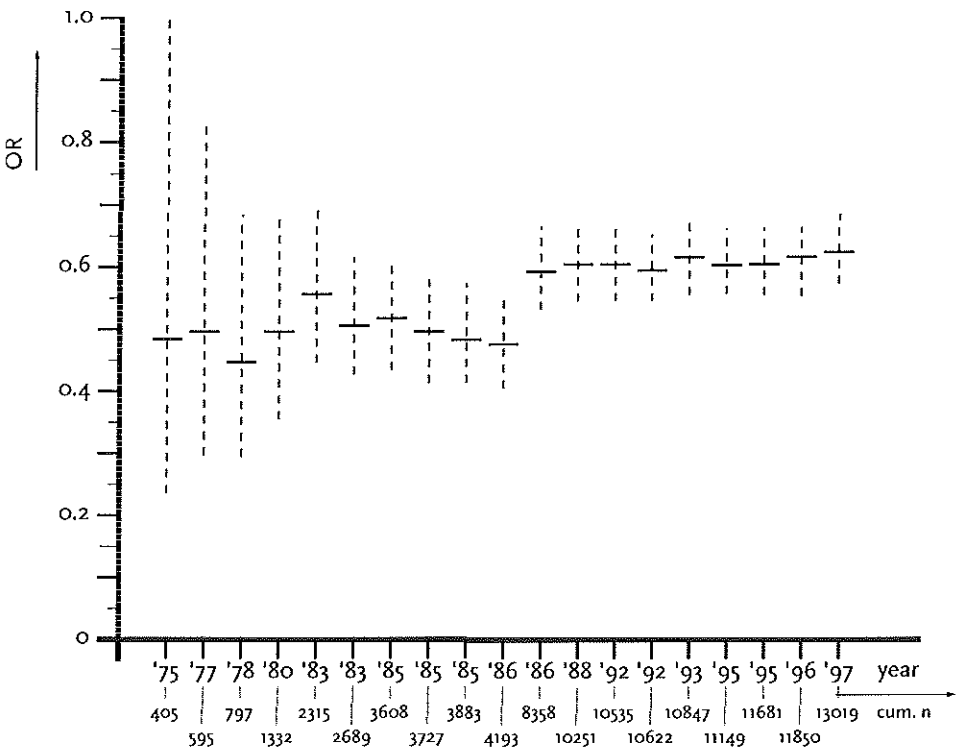
¶ *Age and gender*

£ *Adjusted for five risk strata (No CHD, ATMI, No Hx, Hx of MI, Hx of CHF)*

(OR 0.59, 95% confidence interval 0.53 to 0.66; Figure 1) shows convincing evidence of the effect of smoking cessation in the late 1970s, while the reduction of 40% mortality was demonstrated by 1986.[16] As regards mortality and non-fatal myocardial infarction, 1,310 (23%) events occurred in the quitters as opposed to 2,460 (34%) in the smokers (odds ratio 0.57, 95% confidence interval 0.53 to 0.62). The difference in inclusion criteria partly accounts for the large differences in effect between the various studies. Baseline characteristics as age, gender, cardiac event and period of first survival differed between the studies. Also, different definitions of current smoking and former smoking were used.

Smoking cessation is considered to decrease other endpoints as well. Restenosis rate 7 months after angioplasty was higher in continuing smokers than in those who stopped smoking post-PTCA (55% vs. 38%, P = 0.03). Smokers after a coronary bypass surgery have a 3.3 times increased risk for re-CABG after 5 years (P = 0.03).[23] Prinzmetal anginal attacks appeared in 62% of the smokers vs. 21% in quitters after three months (P < 0.05).[26]

Figure 1 *Cumulative Odds Ratios on mortality of quitters compared to smokers of the nineteen studies.*



Trials of smoking interventions for coronary patients

Ten studies on smoking cessation interventions in patients with established coronary heart disease were published between 1974 and 1999 (Tables 3 and 4). Five studies

Table 3 Description of smoking cessation intervention studies in coronary patients.

Author	Ref	Year	Country	Population	N†	smoking (%)	Follow-up	'non-smoker'	I/C (N)§	Quitters (%) intervent.	Quitters (%) control	I-C‡ (%)	p
Burt et al.	27	1974	England	AMI, male	223	78	1-3 years	CO < 10, thioc < 110◊	125/98	63	28	35	< 0.001
Pozen et al.	28	1977	USA	AMI, ≤ 70 years	102	-	6 months	self-reported	55/47	39 *	21	18	< 0.05
Barr Taylor et al.	29	1990	USA	MI, ≤ 70 years	173	46	1 year	self-reported	86/87	71	45	26	< 0.001
Ockene et al.	34	1992	USA	post-CAG	267	26	6 months	no puff ≥ 1 week	135/132	62	51	11	= 0.06
Engblom et al.[5]	32	1992	Finland	post-CABG	45	20	1 year	self-reported	25/20	44	20	24	< 0.01
Rigotti et al.	33	1994	USA	CABG	87	23	5.5 years	cotinine < 20 ng/ml	44/43	44	44	0	ns
DeBusk et al.	30	1994	USA	AMI, ≤ 70 years	585	43	1 year	cotinine ≤ 10 ng/ml	293/292	70	53	17	< 0.001
Haskell et al.	35	1994	USA	CAG: CHD	34	11	4 years	CO, thiocyanate	12/22	0	0	0	ns
Carlsson et al.	31	1997	Sweden	AMI, > 50 years	67	40	1 year	self-reported	32/35	50	29	21	< 0.05
Johnson et al.	36	1999	USA	Cardiac treatment	102	-	6 months	self-reported	50/52	46	31	15	ns
Total					1,685				857/828	61	42	19	< 0.0001

† *Number of patients forming the trial population*

§ *number of patients in Intervention group (I) and Control group (C)*

‡ *difference of number of patients in Intervention group (I) and Control group (C)*

◊ *Carbonmonoxide < 10, Thiocyanate < 110 (mol/l)*

* *High-risk group (low-risk not mentioned)*

$ *subset of smokers in a multifactorial intervention.*

Table 4 *Smoking cessation interventions in coronary patients*

Author	Multi-factorial	Intervention	Duration*	Intervenor	Indiv/group	Written info	Additional	Setting	Phone	Family
Burt et al.	yes	Information, reinforced advice	?,?	nurse+cardiol.	indiv	info+advice	no	hosp. + fu clinic	no	yes
Pozen et al.	yes	In-hospital talks	> ± 5 hr, ?	nurse	both	literature	no	hosp + visits/phone	1/week	yes
Barr Taylor et al.	no	In-hospital and telephone contacts	?, 6months	nurse	indiv	manual	tapes (NRT)	hosp + outpatient clinic (if smoking)	1/w-1/m	no
Ockene et al.	no	In- + out-hospital and telephone	1.5hr., 3-4m	health educator	indiv (both)	if no counselling	no	hosp + outpatient clinic	4	no
Engblom et al.†	yes	pre- and post-CABG rehabilitation	?, 10 weeks	multi-disciplinary	both	no (?)	no	hosp/rehabilitation	no	no
Rigotti et al.	no	3 sessions in-hospital	1 hour, ?	nurse	indiv	manual	video	hosp + 1 post-discharge telephone	1	yes
DeBusk et al.	yes	Risk-factor and rehabilitation	2 hr, 6 m	nurse	indiv	manual, tailored	video, tape,(NRT)	hosp (+ 1 visit if relapsed)	1/m	no
Haskell et al.	yes	rehabilitation programme	?, ?	psychologist	indiv	goal+ instruction	no	out-patient clinic	no	no
Carlsson et al.	yes	education at outpatient clinic	1.5 hr, 3 m	nurse (cardiol)	both	yes	no?	2r prevention unit	no	no
Johnson et al.	no	info and increasing self-efficacy	?, 3 months	nurse	group (?)	manual	video	2 in-hospital sessions	6/3m	no

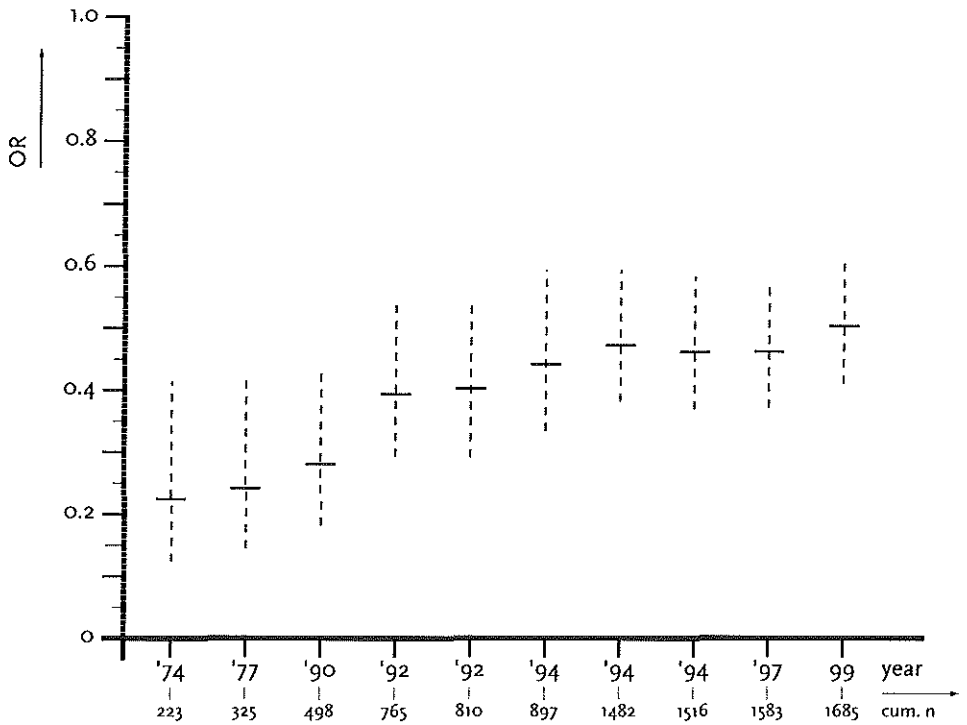
hr = hour; m = months ; w = week; cardiol = cardiologist; indiv = individual; NRT = nicotine replacement therapy; hosp = hospital

* *number of contact hours, period of intervention*

† *subset of smokers in a multifactorial intervention*

were performed on patients who had had a myocardial infarction,[27-31] two studies on patients who underwent coronary bypass surgery,[32,33] two on patients with coronary heart disease on the angiogram[34,35] and one on patients with a need for cardiac treatment [36] (Table 3). Six studies were performed in the U.S.A., one in Canada and three in Europe. In almost all studies, the smoking cessation program was part of a multi-factorial intervention or rehabilitation program, which included physical exercise (Table 4). Two studies were not randomised [27,36] and one was not controlled.[27] Smoking rates were measured at the time of follow-up (definition often not clearly stated) and biochemically validated in four programs. All interventions were started in hospital and in most cases carried out by a nurse. Most counselling was individual, though some hospitals also provided additional group therapy. Written material was provided to enforce information and advice given orally. Some interventions provided additional aids as (relaxation) cassettes or videotapes and some prescribed nicotine substitution for highly addicted patients.

Figure 2 *Cumulative Odds Ratios on smoking of control patients compared to those who received a smoking cessation intervention.*



In six of the interventions, follow-up telephone calls were made, varying from one post-discharge call to weekly calls. Length of contact ranged from approximately 1-5 hours within 3-6 months, but many interventions were not described precisely. Most studies did not include family members in the intervention.

In six of the 10 studies a significantly higher number of quitters was found in the intervention group (Table 3). In these studies, differences between percentages in quitters in the intervention and the control group varied from 14 to 35%. In two studies no difference was found between the two groups, and in two studies more quitters were found in the intervention group, but this was not significant. Sequential meta-analysis of the 10 intervention studies resulted in a total population of 1,685 smokers; with 61% quitters in the intervention group and 42% in the control group (OR = 0.50, 95% confidence interval 0.41 to 0.61, Figure 2), thus 19% more quitters were observed if an intervention was offered. It is difficult to discern characteristics of the successful but very diverse studies, apart from the fact that none of the less effective studies had myocardial infarction as an inclusion criterion.

In three articles, multi-factorial risks were studied and smokers formed only a small part of the total study group, therefore a significant difference between the intervention group and the control group could not be expected. Interventions that had the smoking cessation intervention as part of a larger program described the intervention less extensively. This raises the question as to whether the interventions were less elaborate than programs aimed only at smoking cessation. Differences between the diverging results can be explained by varying circumstances. Inclusion criteria, demographic characteristics, intervention, intervenor and smoking definitions differed widely, which makes comparisons among them unreliable. Moreover, because up to now only a few studies have been performed on smoking cessation interventions for coronary patients, further investigations are needed.

Discussion

Patients who continue smoking at follow-up have a worse prognosis compared to those who stop smoking after a myocardial infarction. Mortality declines by an average of 35%, and mortality or non-fatal myocardial (re-) infarction by 36% in those who have stopped smoking. The relative risk of mortality following a coronary event for quitters compared to permanent smokers ranged from 0.13 to 0.72, while the relative risk of myocardial infarction ranged from 0.23 to 0.68. Publication bias, however, should be taken into account. Short-term effects can be explained by the withdrawal of nicotine, which increases heart rate and blood pressure and thus causes an increase in myocardial oxygen demand[37], and carbon monoxide, which, by carboxyhemoglobin formation, decreases the oxygen-carrying capacity of the blood.[38] Long-term effects could, in part, be explained by a positive effect on the lipid profile[39], but exact mechanisms are still not clear.

Many articles support smoking cessation in patients with coronary heart disease. Simple smoking cessation advice from a physician alone resulted in 3% quitters without relapse within 1 year. Additional support in the form of letters, visits and information folders, resulted in a mean efficacy of 5%.[40] Interventions in special groups such as healthy patients with high-risk of coronary heart disease, are more effective.[41] In this review, differences of up to 35% with on average almost 20% more quitters, were found among those who participated in a smoking cessation program, compared to those who received the usual care. Publication bias could explain the

high odds ratios found in the first three studies and the gap in the studies in the 1980s. Smoking cessation seems to be most effective in myocardial infarction patients, since this is often a (first) serious warning and great emphasis is put on the risk factors. Patients, on the other hand, who undergo coronary interventions, are often believed to be cured and therefore the need of smoking cessation could be underestimated by both the physician and the patient. Many different approaches and tools for smoking cessation interventions are applied. To date, the most effective approach in specific categories of smokers has not been investigated. No particular intervention was shown to be more effective than any other is, but reinforcement is important. In general, smoking cessation interventions, with a high number of contacts and prolonged duration, are the most successful.[43] Furthermore, a multidisciplinary approach with face-to-face contacts are determinants of success, as are the number of intervention modalities. The exact contents of the interventions are often not described in detail. The risk for clinical complications in coronary patients who continue smoking is obviously high, and can enhance motivation to stop smoking. So far, only general smoking cessation programs have been used in coronary patients, and have been shown to be successful.

Nicotine substitution has proved to be effective as an aid to stop smoking.[45] However, clinicians are cautious about prescribing nicotine replacement for cardiac patients, because of adverse cardiovascular effects, especially if patients continue smoking.[44] In a randomised, placebo-controlled study of transdermal nicotine in 156 patients with coronary heart disease, no difference in adverse affects was demonstrated between the nicotine replacement therapy group and the control group.[45] This was confirmed in a study of 584 outpatients with a diagnosis of cardiovascular disease.[46]

Socio-demographic predictors of smoking cessation were shown in several studies: older age, male, higher educational level, recent hospitalisation; and in women the number of cigarettes and marital status.[47-49] For patients, the following clinical predictors for smoking cessation were found: a history of coronary heart disease, a long hospital (CCU) stay as well as a higher creatine phosphokinase elevation.[47,50,51] An intervention, such as PTCA and CABG and the presence of other coronary risk factors predicted continued smoking, whereas having unstable angina was associated with quitting smoking.[48,52]

In addition, the psychological aspects of behaviour change need to be taken into account when offering cardiac patients a smoking cessation intervention. The continuing smoker has a less negative attitude to smoking and tends to be more of a worrier than the ex-smoker.[47] In a study of 164 post-myocardial patients, the relationship between personality characteristics and smoking behaviour modification was investigated. Persistent smokers appeared to have higher levels of anxiety and depression than quitters 5 months after the myocardial infarction. This applied especially to the elderly smoking patients, who also were characterised by a low level of somatisation.[53] A history of major depressive disorder is often found in smokers, while more smokers are individuals with a history of major depressive disorder. Smokers with a major depressive disorder were less successful in their attempts to

stop smoking, since smoking cessation for these patients can result in depressive symptoms.[54] Several studies found a high incidence of psychiatric disorders in cardiac patients, in particular depressive symptoms.[55] Only a minority of depressive cardiac patients received anti-depressive treatment,[56] presumably because of inadequate diagnosis and reluctance by cardiologists to prescribe antidepressant drugs because of cardiovascular side-effects.[57,58] Recently, the positive effect of bupropion on smoking cessation was published, which could be of additional help in the future.[59] Smoking cessation interventions should be adjusted in the light of psychiatric disorders, such as depressive symptoms, and also social, financial, and other possible individual influences should be taken into account, to enhance the effect.

Clinical implications

It is generally accepted that it is the physician's task to repeatedly draw the patient's attention to his/her unhealthy behaviour. In the new recommendations of the European Task Force on coronary prevention, it is stated that patients should be encouraged and supported to stop smoking.[3] However, making patients stop smoking is a difficult task. cost-effectiveness It is important to identify at what stage patients are to be given appropriate support. Prochaska et al. divided smokers' intention to change in five continuous stages: precontemplation (do not want to stop), contemplation (consider stopping), preparation (make preparations to stop), action (attempt to stop) and maintenance (sustain non-smoking). With a few simple questions, a patient's stage of change can be assessed. Matching cessation interventions to the stage of change improves its success.[60] Unfortunately, it is very difficult to offer help to smokers who do not wish to stop smoking. Information about the hazards of smoking and evidence of the effects of smoking cessation, as offered in this review, could persuade them to consider quitting. Subsequently, a smoking intervention can be offered to enlarge motivation, so that preparations can be made to set a date to stop smoking. In addition to a regular smoking cessation counselling, written material could be offered and possibly nicotine substitution to those who are heavily addicted. Social support seems to enhance the chance of success,[61] so involvement by the family could be profitable. Research on how to help cardiac patients who continue to smoke is scarce. Studies performed so far are promising, but intervention programs need further elaboration to assess which intervention is most effective for whom.

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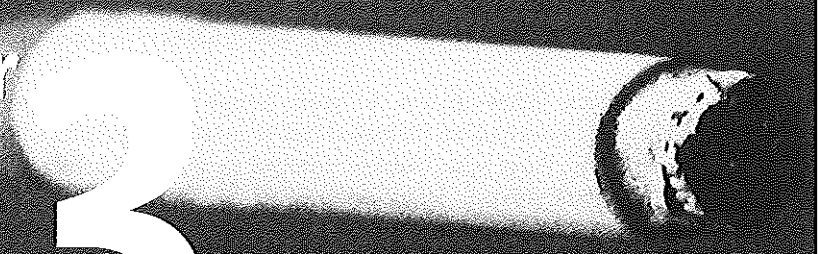
Blanco

Smoking cessation reduces mortality after coronary artery bypass surgery.

Chapter 3



A 20-year follow-upstudy.

Summary

Aims To determine the influence of smoking cessation on mortality after coronary artery bypass surgery, which has still not been established clearly.
Cigarette smoking is one of the known major risk factors of coronary artery disease.

Methods One thousand and forty-one patients underwent coronary artery bypass surgery between 1971 and 1980. The pre-operative and post-operative smoking habits of 985 patients (95%) could be retrieved and were analysed in a multivariate Cox analysis.

Results The median follow-up was 20 years (range 13-26 years). Smoking status before surgery did not entail an increased risk of mortality: patients who had smoked before surgery and those who had not smoked in the year before surgery had a similar probability of survival. However, smoking cessation after surgery was an important independent predictor of a lower risk of death and coronary reintervention during the 20-year follow-up when compared to patients who continued smoking. In analyses adjusted for baseline characteristics, the persistent smokers had a greater relative risk of death from all causes (RR 1.68, 95% confidence interval 1.33 to 2.13) and cardiac death (RR 1.75, 95% confidence interval 1.30 to 2.37) as compared to patients who stopped smoking for at least 1 year after surgery. The estimated benefit of survival for the quitters increased from 3 percent at 5 years to 14 percent at 15 years. The quitters were less likely to undergo repeat coronary artery bypass surgery or a percutaneous coronary angioplasty procedure (RR 1.41, 95% confidence interval 1.02 to 1.94).

Conclusion Patients who continued to smoke after coronary bypass surgery had a greater risk of death than patients who stopped smoking did. They also underwent repeat revascularisation procedures more frequently. Cessation of smoking is therefore strongly recommended after coronary bypass surgery. Clinicians are encouraged to start or to continue smoking-cessation programs in order to help smokers to quit smoking, especially after coronary artery bypass surgery.

Introduction

It is well established that cigarette smoking is a major contributor to the risk of coronary heart disease.[1,2] Previous studies have shown that smoking is strongly related to myocardial infarction[3-5] and cardiac death[6] in the general population. A recent study has shown that cessation of smoking after percutaneous coronary angioplasty (PTCA) may have an important beneficial effect on the clinical course following the procedure.[7] Some studies suggested that continuation of smoking is a greater risk for atherosclerosis of vein grafts than non-smokers[8,9], whereas two other studies showed a beneficial effect on clinical events after coronary artery bypass surgery (CABG).[10,11] However, the effects of smoking and smoking cessation after CABG on mortality have not been clearly established. In the present study, we assessed the relation between smoking cessation and the mortality risk after CABG and determined whether smoking cessation after CABG affected the need for repeat revacularisation procedures. To this end, a group of 985 patients who were operated upon between 1971 and 1980 were therefore followed during a 20-year period.

Patients and methods

Patient population

All 1,041 consecutive patients who underwent a first CABG surgery between February 1971 and June 1980 at the Thoraxcenter were considered for this study. The bypass grafts in all these patients were all of saphenous vein material only. The medium-term and long-term survival probabilities of this group have been published previously.[12-14] The smoking habits before and after surgery could be retrieved from 985 patients. The population consisted of 866 males (88%) and 119 females (12%) with a mean age of 53 and 55 years respectively. Multivessel disease was present in 81% of the patients and impaired left ventricular ejection fraction (< 55%) was found in 27% of the patients.

Follow-up

Follow-up for vital status was obtained by contacting the civil registry in writing and was complete in 98%. Median follow-up was 20 years (range 13-26 years). Mortality was divided into peri-operative mortality (death occurring within 28 days after surgery) and late mortality. The latter was subdivided into:

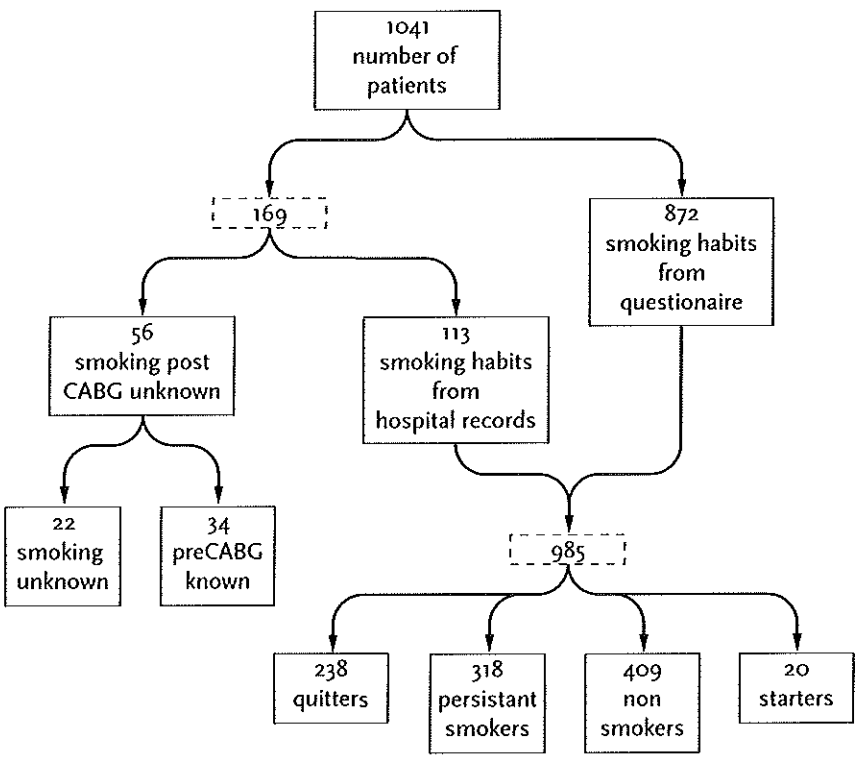
1. death at re-CABG or PTCA;
2. acute cardiac death (within one hour after beginning of complaints, believed to be of cardiac origin);
3. death caused by myocardial infarction (ascertained by enzyme measurement and ECG);
4. death caused by chronic cardiac failure;
5. death from a non cardiac cause;
6. unknown cause of death.

The cause of death was determined by checking our own hospital records, by contacting the referring hospitals (for autopsy reports or letters to the general practitioner) or the attending general practitioner.

Smoking behaviour

In 1981, all patients were queried about their smoking status before surgery and after surgery. At that time, May 1981, 64 (6.2%) of the original group of 1,041 patients had died and another 8 had moved abroad.[14] The remaining patients were sent a questionnaire to ascertain their post-operative condition and smoking habits. We were able to retrieve the pre-operative and post-operative (recorded at least 1 year after surgery) smoking habit status of 985 patients (95%, Figure 1). The small number of patients[20] who started to smoke after CABG were excluded from the present analysis. In the 56 patients whose smoking status at least one year after CABG was unknown, 48 of the 56 patients had died at the time when the patients were queried about their smoking behaviour (peri-operative mortality: 12 patients; 1-year mortality: 33 patients, of which 25% non-cardiac). The baseline characteristics of these 56 patients were similar to the group of patients in whom the smoking was known. The median duration between CABG and the assessment of smoking behaviour was 2.8 years (range 11 months to 9.5 years). The study population was divided into two groups: smokers and non-smokers (both ex smokers and never smokers) in the year before CABG; the smokers before surgery were further subdivided into quitters who had stopped smoking in the first year after the index CABG (most immediate after CABG) and persistent smokers, those who smoked before CABG and continued to smoke for at least one year after CABG.

Figure 1 *Flow-chart of the subdivision of the smoking habits of 1041 consecutive patients who underwent a first CABG surgery between 1971 and 1980.*



Data management and statistics

Differences between the smokers and non-smokers, as well as quitters and persistent smokers were calculated by means of the Student's t-test for continuous data or the chi-square test for categorical data. Pre-selected variables were age, sex, and extent of vessel disease, pre-operative ejection fraction and complete or incomplete revascularisation. A vessel was considered diseased when the luminal diameter narrowing of at least 50% was seen in more than one projection. Ejection fraction was angiographically calculated in 705 patients and considered impaired if less than 55%. A complete revascularisation was defines as "no remaining main artery stenosis of at least 50%." The survival data were analysed using the Kaplan Meier method. The log-rank test was used to compare survival curves. Univariable Cox proportional-hazard model was used to estimate the unadjusted relative risks for non-smokers as compared to smokers at the time of surgery and to compare quitters and persistent smokers after surgery. A multivariate Cox model, adjusting for the pre-selected clinical and angiographic parameters, was used to estimate the adjusted relative risks.

Table 1 *Baseline characteristics of 985 patients undergoing successful coronary artery bypass surgery according to smoking status.*

		Non-smokers at time of surgery	Smokers at time of surgery		
			all	quitters[1]	persistent smokers
Event	n=	429	556	238	318
Age (yrs)		55.1	51.2*	51.7	50.8
Male (%)		83	92*	90	93
Number of bypass grafts		2.8	2.6	2.6	2.7
Vessel disease (%) †					
1-vessel		17	20	26	16
2-vessels		32	29	25	35
3-vessels		42	42	40	43
left main		9	7	9	6
Ejection fraction (%)					
normal		58	58	58	58
moderate (30 - 55%)		25	22	23	22
poor (≤ 30%)		3	3	2	3
unknown ‡		15	17	17	17
Revascularization (%)					
complete		79	79	80	79
incomplete		21	21	20	21

ʃ *Quitters were defined as patients who quit smoking for at least one year after the index procedure and persistent smokers as patients who were still smoking at least one year after the index procedure.*

* $p < 0.05$ *comparing smokers vs. non-smokers;*

† *when comparing quitters and persistent smokers (2x4 table) a* $p < 0.05$ *was found;*

‡ *due to insufficient quality or absence of the ventriculogram.*

Results

The baseline clinical characteristics of the smokers and non-smokers are shown in Table 1. Smokers at the time of surgery were four years younger and more often male compared to non-smokers. The clinical characteristics of quitters and persistent smokers were comparable except for a larger proportion of multivessel disease amongst the persistent smokers.

Median follow-up was 20 years (range 13-26 years). Death occurred in 234 (54%) of the 429 non-smokers at the time of surgery, of which 65% due to cardiac causes. Of the 556 smokers before CABG, 311 patients (56%) died within 20 years; of which 65% due to cardiac causes (Table 2). Of the 238 patients who stopped smoking after CABG, 109 patients (46%) died within 20 years, whereas 202 (64%) of the 318 persistent smokers died during the follow-up. A cardiac cause of death was found in 62% of the quitters and in 68% of the non-quitters.

Table 2 *Number of events (%)*

		Non-smokers at time of surgery	Smokers at time of surgery		
			all	quitters	persistent smokers
Event	n=	429	556	238	318
Death from all causes		54	56	46	64
Sudden death		26	29	26	30
Fatal myocardial infarction		14	13	14	12
Reintervention death		8	5	5	4
Other cardiac death		17	19	18	22
Non-cardiac death		26	25	26	23
Unknown death		9	10	12	9
PTCA		13	11	9	13
Repeat CABG		28	29	27	31
PTCA or repeat CABG		35	33	30	36

Mortality

In the univariable analysis (Table 3), the persistent smokers had higher risks of death from all causes (relative risk [RR] 1.56, 95% confidence interval 1.24 to 1.97) and also from cardiac death (RR 1.70, 95% confidence interval 1.26 to 2.29) compared to the quitters. The smoking habit was the strongest predictor of mortality in a stepwise multivariate Cox analysis, even when all other baseline risk factors were forced into the model. The persistent smokers had a significantly greater risk of death from all causes (RR 1.68, 95% confidence interval 1.33 to 2.13) and of cardiac death (RR 1.75, 95% confidence interval 1.30 to 2.37) compared to patients who quit smoking after CABG.

The estimated survival curves for the patients who quit smoking and those who continued to smoke diverged approximately 4 years after the index operation, and the difference between the two curves increased throughout the follow-up period (Figure 2). The estimated benefit in survival associated with the cessation of smoking increased from 3 percent at 5-year (98 vs. 95%), to 10% at 10-years (88 vs. 78%) and 15% at 15-year (70 vs. 55%). After 20-year the benefit was still 8% (47 vs. 39%).

Table 3 *Univariable and adjusted relative risks of total mortality, cardiac death, repeat coronary bypass surgery or coronary angioplasty.*

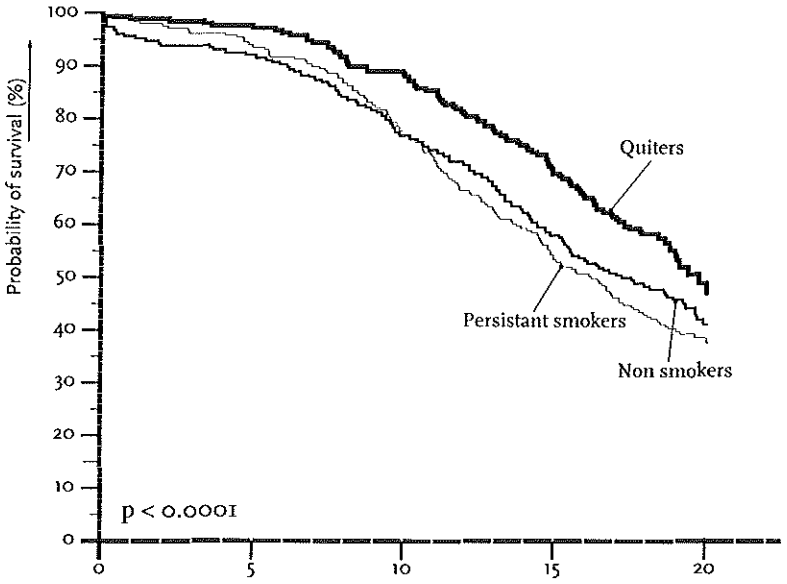
	smokers vs. non-smokers		persistent smokers vs. quitters	
Event	**RR**	**95% CI**	**RR**	**95% CI**
Deaths of all causes				
Unadjusted relative risks	1.04	0.88-1.22	1.56	1.24-1.97
Adjusted relative risks *	1.18	0.99-1.40	1.68	1.33-2.13
Cardiac death				
Unadjusted relative risks	1.05	0.85-1.30	1.70	1.26-2.29
Adjusted relative risks *	1.14	0.91-1.41	1.75	1.30-2.37
PTCA				
Unadjusted relative risks	0.78	0.55-1.12	1.50	0.89-2.53
Adjusted relative risks *	0.66	0.46-0.97	1.56	0.88-2.79
Repeat CABG				
Unadjusted relative risks	1.00	0.79-1.27	1.38	1.01-1.89
Adjusted relative risks *	0.82	0.64-1.04	1.42	1.01-1.97
Repeat CABG/PTCA				
Unadjusted relative risks	0.91	0.74-1.13	1.42	1.05-1.90
Adjusted relative risks *	0.76	0.61-0.95	1.41	1.02-1.94

* *Adjusted for age, sex, vessel disease, ejection fraction, complete revascularization.*

Repeat procedure

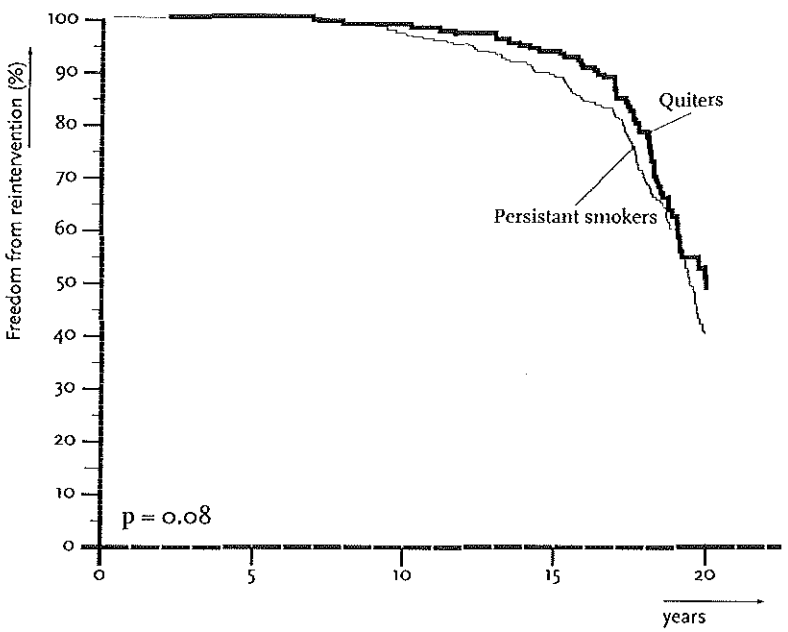
Repeat coronary bypass surgery was performed in 27% of the patients who quit smoking and 31% of the persistent smokers. During follow-up, repeat coronary artery revascularisation (either CABG or PTCA) was performed more frequently among the persistent smokers compared to quitters (RR 1.42, 95% confidence interval 1.05 to 1.90). An identical survival rate and a repeat coronary artery revascularisation rate were found between the smokers and non-smokers at the time of surgery. Also, when adjusted for baseline characteristics, repeat CABG or PTCA was more frequently found among the persistent smokers compared to patients who quit smoking (RR 1.41, 95% confidence interval 1.02 to 1.94).

Figure 2 *Twenty-year survival from all causes curves for patients who quit smoking after CABG, persistent smokers after CABG and non-smokers.*



at risk				
238	*quitters*	*208*	*165*	*25*
318	*persistent smokers*	*246*	*171*	*46*
409	*non smokers*	*338*	*250*	*49*

Figure 3 *Twenty-year freedom from a coronary reintervention (CABG or PTCA) for patients who quit smoking and persistent smokers after CABG.*



the rates were similar up to ten years, after which the curves for quitters and persistent smokers diverged.

Discussion

The present study examined the influence of patient's smoking habits before and after coronary bypass surgery on mortality and repeat revascularisation procedures. The relatively high proportion of smokers at the time of surgery (56%) in our study group is due to the fact that our patients date from the 70s. Since health care programs in the 80s encouraged patients to stop smoking, the percentage of coronary patients who smoke, has steadily decreased to around 30% in the Netherlands. However, this figure still compares unfavourably to other West-European or North American countries.[15]

There has been much controversy about whether smokers should receive the same opportunities for coronary bypass surgery as non-smokers.[16,17] Discussion on this subject was mainly based on the consistent finding that continued smoking after CABG increased clinical complications, such as myocardial infarction and repeat coronary revascularisation. Voors et al.[11], demonstrated that at one year after surgery smokers had more than twice the risk for myocardial infarction and reoperation as compared to patients who had stopped smoking since surgery. Previous short- and medium- term studies or studies on subpopulations have shown improved survival in patients whom stops smoking after myocardial infarction.[4,18-22] A recent publication of the Mayo Clinic investigators[7] showed an increased relative risk of 44% of death among the persistent smokers compared to quitters after percutaneous coronary revascularisation. However, to the best of our knowledge, the benefit of smoking cessation on the risk of death after coronary bypass surgery is still unknown.

Survival

In our study, after adjustment for clinical and angiographic characteristics, the persistent smokers had a greater risk of death from all causes as compared to patients who stopped smoking after surgery during the very long follow-up of 20 years. Improved survival rates were seen from approximately 4 years after CABG. During that time the risk of death from any cause was 68% greater in patients who persisted in smoking after coronary bypass surgery than in those who quit. The estimated survival curves for the two groups diverged at 4 to 5 years after surgery and continued to diverge throughout the entire follow-up period. The benefit of smoking cessation on mortality may be explained largely, by the reduction in cardiac deaths, since the relative risk of cardiac death was 75% higher for the persistent smokers than for the quitters. Voors et al.[11], found a similar relative risk of mortality of 1.7. However, probably due to the limited number of patients, this risk was statistically not significant.

Repeat procedure

In agreement with the findings of Voors et al[11], we found that persistent smokers do need more repeat coronary revascularisation procedures than quitters do. In that study, patients who continued to smoke after surgery had a 41% higher risk of undergoing a repeat coronary bypass operation or a percutaneous angioplasty

procedure. In our study coronary reintervention up to 10 years was rare after coronary bypass surgery. Thereafter this incidence increased, probably due to graft atherosclerosis and progression of native coronary artery disease. Nevertheless, the reintervention rates diverged; starting at 10 years postoperative, in favour of the quitters when compared to persistent smokers.

Smoker's paradox

Many investigations have demonstrated that smoking is associated with higher rates of heart disease. It is therefore surprising that smoking habits at the time of surgery did not significantly influence survival and reintervention rates during the follow-up period. In addition Hasdai et al.[7], reported that smokers had fewer adverse events at the time of a PTCA than non-smokers did. Other studies such as the GUSTO-I investigators[23] have speculated on the paradoxical beneficial effects of smoking on thrombolytic therapy after myocardial infarction. In these studies the better prognosis for smokers was mainly explained by the difference in clinical baseline characteristics such as an age difference. After adjustment for all clinical baseline characteristics, these studies showed no significant difference in mortality between smokers and non-smokers. In our study, the similarity in risk of death and reintervention rate between the two groups can not completely be explained by these baseline parameters, as the smokers were only four years younger than non-smokers. Another explanation could be selection bias, since many smokers tend to die of fatal myocardial infarctions before they having the chance to undergo coronary bypass surgery.[24] Thus, those operated upon are different from the entire smokers cohort with coronary artery disease. Moreover, only patients who survived the immediate post-operative period were included in our study, which could have caused further selection. Another explanation may be that coronary bypass surgery facilities were scarce at the time, causing long waiting lists. Only the survivors of the waiting time were operated upon.

Finally, our data do not support the proposal that smokers should receive fewer opportunities for coronary bypass surgery than non-smokers, as the survival rate of non-smokers and smokers were similar at the time of surgery.

The study consisted of patients who underwent coronary bypass surgery using vein grafts in the 70s. To extrapolate the findings of this study to current practice it needs to be realised that operation techniques have been changed and present day populations are different. Total arterial revascularisation is currently propagated to prevent premature death due to graft sclerosis. The present study has some shortcomings. We did not recorded the number of cigarettes smoked. Second, there may have been other factors intercorrelating with smoking behaviour that we did not record. For example, smoking cessation could be accompanied with other life style changes such as a diet. The MRFIT study group has investigated that in 12,866 high risk men smoking cessation was the strongest predictor of lower rates of coronary disease as compared with other changes in risk factors such as cholesterol and blood pressure lowering interventions.[25] However, the effect of risk factors such as diabetes and hypercholesterolaemia was not yet clearly established in the 70s. Only variables already known to influence survival at that time such as left ventricular function and

extent of vessel disease, were consistently reported and therefore used for further analysis. Smoking status was assessed by asking patients about their smoking behaviour and, if necessary, from the hospital records. This remains a possible cause of bias, as we were not able to check reported data against biochemical validation. However, self-reports of smoking in observational studies in an adult population such as this have a high sensitivity and specificity.[26]

Conclusions

Our results strongly indicate that after coronary bypass surgery patients who do not stop smoking have a markedly elevated risk of premature death and a higher rate of repeat revascularisation procedures compared to those who do stop. Cessation of smoking is therefore strongly recommended after coronary bypass surgery and clinicians are encouraged to start or continue smoking-cessation programs[27] in order to help patients to stop smoking.

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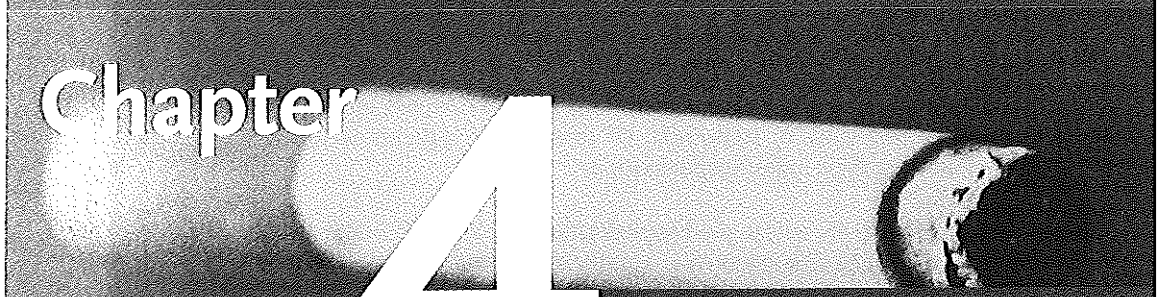


Chapter 4

The EUROASPIRE survey.

Summary

Aims To establish to what extent smoking status and its management are recorded in coronary patients' medical records, and to investigate their motivation to change smoking behaviour.

Methods In EUROASPIRE, a survey on secondary prevention in 21 hospitals in the Czech Republic, Finland, France, Germany, Hungary, Italy, the Netherlands, Slovenia and Spain, data were collected from records of 4,863 consecutive patients (70 years of age, with previous (> 6 months) admission for coronary bypass operation, angioplasty, myocardial infarction or ischaemia. Of these, 3,569 patients were interviewed 1.6 years following their index hospitalisation.

Results Of the 82% patients whose pre-hospitalisation smoking behaviour was known, 34% were smokers. Documentation was significantly better in younger patients, in males and patients requiring angioplasty or bypass operation. In only 35% of 1364 smokers was the smoking habit recorded again after discharge from hospital. At the time of the interview, 554 of the interviewed patients were still smoking. In over 90% of the smokers, advice to quit smoking was reported at interview. A positive relationship was found between receiving advice and seeking help to stop smoking, between receiving advice to stop smoking and attempting to stop, as well as between seeking help and attempting to stop.

Conclusion In almost 20% of coronary patients, smoking habits are not documented in medical records, and in only 35% of the smoking patients is smoking status documented at the follow-up. After a cardiac event requiring hospitalisation, as many as 50% of the patients continue their smoking habit and so there is further potential to reduce the risk of recurrent coronary disease. Advice to stop smoking motivates patients to seek help and to attempt to stop smoking. Physicians repeated advice to stop smoking is important and smoking status should always be documented at follow-up.

Introduction

In recent decades, a large number of epidemiological studies demonstrated a relationship between cigarette smoking and the occurrence of cardiovascular diseases.[1,2] A high incidence of cardiovascular disease is reported in smokers compared to non-smokers, and hence a higher rate of cardiovascular deaths in smokers. In the extensive British doctors study, the observed cardiac mortality in a 40-year follow-up among smokers under 65 was more than twice that of non-smokers.[3] Therefore, the effect of smoking cessation was also investigated. In a study of 2336 healthy smoking young men, the rate of a myocardial infarction among those who stopped smoking at some time during 18 years of follow-up was only half the rate of those who continued.[4]

The favourable effect of smoking cessation on the prognosis of patients with established coronary artery disease, especially after myocardial infarction,[5] but also coronary bypass operation,[6] has been well established. Stopping smoking after a coronary event significantly diminishes the probability of death and myocardial infarction[7]; besides this, lower hospitalisation rates were observed.[8] Furthermore, smoking cessation is by far the most effective and cost-effective way to reduce the risk of cardiac complications.[9]

In 1994, the recommendations on prevention of coronary heart disease of the European Society of Cardiology, the European Atherosclerosis Society and the European Society of Hypertension were published.[10] As part of the strategy to enable the adoption, dissemination and implementation of these recommendations, a European survey on the evaluation of current secondary prevention practice was started (EUROpean Action on Secondary Prevention through Intervention to Reduce Events; EUROASPIRE). The primary aim was to determine to what extent major risk factors for coronary heart disease and their management are recorded in the files of coronary patients. A second objective was to describe patients' lifestyle at least 6 months after hospitalisation for a coronary event.[11] In the Guidelines on acute myocardial infarction, smoking cessation is described as potentially the most effective of all secondary prevention measures and therefore much effort should be devoted to this end. Support and advice is needed during rehabilitation and a smoking cessation protocol should be adopted in each hospital.[12] EUROASPIRE made an inventory of the registration and management of smoking behaviour in coronary patients in several hospitals across Europe and the change in lifestyle after hospitalisation for a coronary event.

Methods

The Euroaspire survey

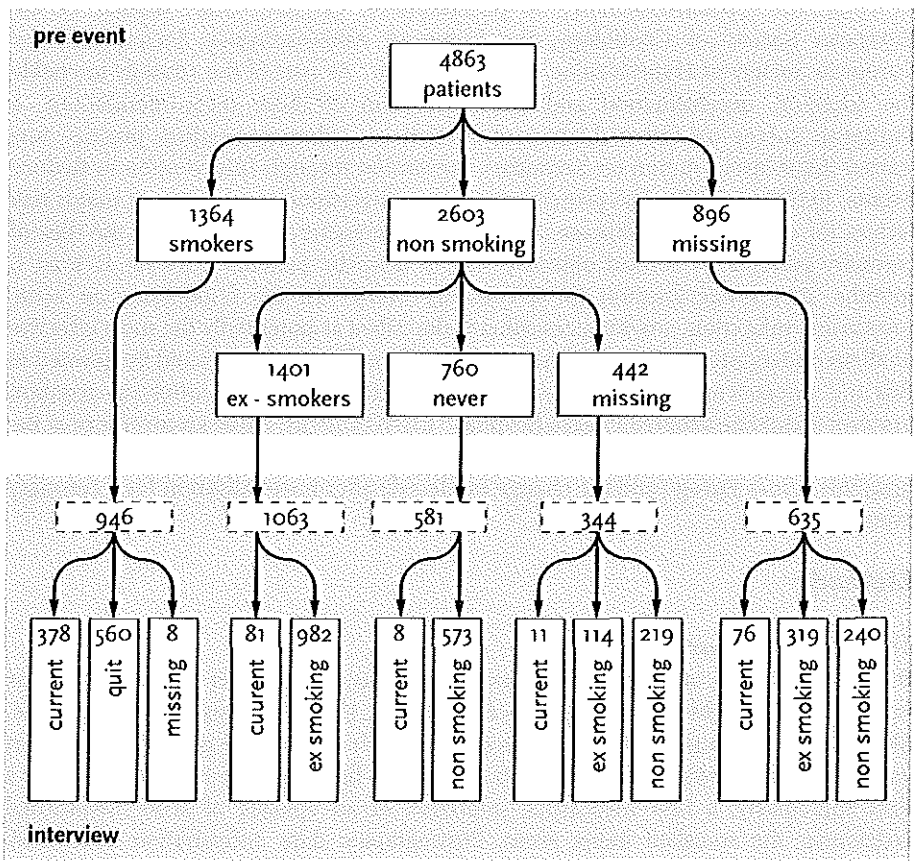
Between May 1995 and April 1996, twenty-one selected hospitals from nine regions in the Czech Republic, Finland, France, Germany, Hungary, Italy, the Netherlands, Slovenia and Spain participated in this survey. 4,863 consecutive patients (≤ 70 year) were enrolled following hospitalisation for either a first coronary bypass operation, a first angioplasty, a first myocardial infarction or an episode of acute myocardial ischaemia: the so-called index event. Demographic data, information about risk

factors, treatment and prescribed medication were collected from the medical records over the period before, as well as after, the index event. 3,569 patients were interviewed (73% response), on average 1.6 years after the event. Information was obtained about life style, and about advice received concerning the coronary risk factors; besides this, measurements of blood pressure, height and weight, cholesterol, glucose and carbonmonoxide were performed. A detailed description of the EUROASPIRE survey has been published.[11]

Present study

The present study is based on data from the EUROASPIRE survey. Data which were collected from the medical records were used to describe the cardiologists' policy with regard to registration, and management of patients' smoking behaviour. Data from the interview were used to describe patients' smoking behaviour after the index event, as well as actions taken to change to a healthier lifestyle. Self-reported smoking habits were compared with the measured expired carbonmonoxide, with the threshold set at 10 particles per millilitre. Other coronary risk factors were also evaluated. Patients were categorised according to their smoking status at the time of the hospitalisation

Figure 1 *Overview of all 4,863 participating patients.*



and at the interview. Current smokers are those who were smoking at the time of recording or interview, respectively. Non-smokers were divided into ex-smokers (those who had smoked sometime before the recording or interview) and never smokers.

Statistics
Univariate comparisons of differences in baseline and outcome variables between the groups were done by a Chi-square analysis for categorical variables and a Kruskal-Wallis test for ordinal variables. Multivariate analyses of the effects of all demographic variables were done by multiple logistic analysis. Differences were considered statistically significant if the P-value was less than 0.05.

Results

Quality of documentation of smoking behaviour

Pre-event
Smoking status (current smoking or non-smoking) was documented before the index event in 3,967 (82%) of all 4,863 patients (Figure 1). Pre-event smoking documentation was significantly more frequent ($P < 0.001$) in younger patients (<50 years: 85%; 50-60 years: 84% and 60-70 years: 79%, Table 1). In addition, smoking documentation was more common in males (85% vs. females 73%) and in those enrolled for bypass surgery or angioplasty (87% and 84% respectively vs. 78% for both myocardial infarction and ischaemia). 1,364 (34%) patients of those, whose pre-hospitalisation smoking status was recorded, were smokers and 2,603 (66%) non-smokers. In 442 (17%) of the recorded non-smokers, no past history of smoking (ex-smoking or never smoking) was recorded. Prevalence of other coronary risk factors was less frequently recorded in the medical records than smoking behaviour: hypertension in 78% of the cases, diabetes in 75%, hyperlipidaemia in 59%, and family history of coronary heart disease in 69%. In records without information about smoking status, all coronary risk factors were entered significantly less frequently than in records in which smoking status was recorded.

Post-event
Smoking behaviour after the event, in pre-event recorded smokers, was documented in 472 (35%) patients, on average 1.2 years (median 1.0 year, interquartile range 0.7 to 1.6) after the index event. Almost half of the patients (221) were still smoking. In 57% of the post-event smokers, some action of the cardiologist, to change patients' behaviour, was recorded. In 48%, simple oral advice was given to stop smoking, in 9% some form of counselling was encouraged.

Smoking behaviour as assessed during the interview

Current smokers
At the time of the interview, on an average 1.6 years post-event, 554 (16%) of the 3,569 interviewed patients were self-reported current smokers (Table 2). 1,294 patients

(of whom 281 had died) did not attend the interview. Compared to patients who did attend the interview, those who were not interviewed were more likely to be women ($p < 0,05$), more likely to belong to the acute ischaemia and myocardial infarction group, less often had a history of coronary artery disease and were more often pre-event smokers ($p < 0,001$).

Table 1 *Pre-event recording of smoking status and smoking behaviour within different categories.*

	n	Recorded smoking status	Smoking	Non-smoking		
				Ex	Never	Unknown
All n =	4,863	3,967	1,364	1,401	760	442
		(82%)	(34%)	(54%)	(29%)	(17%)
Age		*	†	*		
< 50 yr.	1,007	85%	55%	28%	10%	7%
50-60 yr.	1,563	84%	36%	34%	20%	10%
> 60 yr.	2,293	79%	23%	40%	23%	14%
Gender		†	†	†		
Male	3,662	85%	38%	41%	13%	8%
Female	1,201	73%	23%	17%	39%	21%
Country		†	†	†		
Czech Republic	526	85%	33%	40%	20%	6%
Finland	531	84%	21%	39%	31%	9%
France	546	84%	42%	36%	18%	4%
Germany	524	84%	37%	30%	27%	6%
Hungary	546	66%	43%	20%	22%	15%
Italy	619	92%	32%	38%	28%	2%
the Netherlands	535	68%	41%	24%	4%	31%
Slovenia	526	74%	29%	37%	20%	14%
Spain	510	97%	33%	46%	0%	20%
Index event		†	†	†		
CABG	1,179	87%	24%	46%	19%	12%
PTCA	1,156	84%	30%	43%	17%	10%
AMI	1,387	78%	50%	24%	18%	8%
Ischaemia	1,141	78%	33%	28%	23%	16%
Hx of CAD		†	†			
No	1,547	81%	51%	22%	19%	8%
Yes	3,286	82%	27%	42%	19%	12%

univariate chi-square test

* $P < 0.005$;

† $p < 0.001$

There was good agreement (κ-value 0.7) between self-reported smoking habits and breath carbonmonoxide measurements. In fewer than 5% of the patients who said they were not smoking, the breath carbonmonoxide value exceeded 10 particles per millilitre.

Of the 946 pre-event smokers, 378 (40%) were still smoking at the time of the interview (Table 3). In eight patients, information about smoking status was missing. The pre-event smoking status was not recorded in 76 out of the remaining 176

Table 2 *Characteristics of the patients who did attend the interview according to smoking behaviour at interview.*

		Interviewed	Smoking	Non-smoking	
				Ex	Never
All	n =	3569	554	2056	959
		(73% of 4863)	(16%)	(68%)	(32%)
Age			†	†	
< 50 yr.		73%	27%	58%	14%
50-60 yr.		75%	17%	57%	26%
(60 yr.		72%	9%	58%	33%
Gender		*	†	†	
Male		74%	17%	66%	17%
Female		71%	10%	32%	58%
Country		†	†	†	
Czech Republic		63%	12%	57%	31%
Finland		78%	2%	49%	39%
France		73%	19%	56%	25%
Germany		75%	13%	64%	23%
Hungary		77%	20%	52%	28%
Italy		69%	17%	60%	23%
the Netherlands		72%	29%	57%	14%
Slovenia		76%	9%	57%	34%
Spain		76%	9%	67%	24%
Index event		†	†	†	
CABG		77%	10%	65%	25%
PTCA 7		8%	17%	59%	24%
AMI		67%	16%	61%	23%
Ischaemia		72%	19%	44%	36%
History of CAD		†	∫		
No		70%	18%	58%	24%
Yes		75%	15%	58%	27%

univariate chi-square test

* $p < 0.05$

∫ $p < 0.01$

† $p < 0.001$

interviewed smoking patients, while 100 patients were recorded as being non-smokers. A large majority (512) of the 554 smoking patients at the time of the interview smoked cigarettes. The average number of cigarettes smoked per day was 10

Table 3 *Differences in characteristics between pre-event smokers who stopped smoking after the index event and those who persisted to smoke.*

	Persisted	Stopped
n =	378	560
Age		
< 50 yr.	44%	56%
50-60 yr.	41%	59%
> 60 yr.	36%	64%
Gender*		
Male	41%	59%
Female	38%	62%
Country†§		
Czech Republic	34%	66%
Finland	54%	46%
France	39%	61%
Germany	30%	70%
Hungary	51%	49%
Italy	45%	55%
The Netherlands	62%	38%
Slovenia	29%	71%
Spain	22%	78%
Index event†§		
CABG	37%	63%
PTCA	43%	57%
AMI	31%	69%
Ischaemia	57%	43%
Hx of CAD†§		
No	34%	66%
Yes	46%	54%
Advice offered†		
No	18%	82%
Yes	44%	56%
When offered†		
Before event	49%	51%
In hospital	35%	65%
After event	61%	39%

* *Multivariate P-value < 0.05*
† *Univariate P-value < 0.001*
§ *Multivariate P-value < 0.001*

Table 3 - *continued* -

	Persisted	Stopped
n =	378	560
Help sought†		
No	37%	63%
Yes	59%	41%
Attempt to stop†		
No	90%	10%
Yes	36%	64%
How†		
Abstinence	23%	77%
Reduction	78%	22%
Nicotine substitution	68%	32%
Other	56%	44%

† *Univariate P-value*

(interquartile range 5 to 20). In a multivariate analysis, patients who underwent angioplasty or were admitted for acute ischaemia, and those with a history of coronary artery disease were least likely to stop smoking. Smoking cessation figures differed widely between the countries (Table 3). In patients who persisted in smoking, advice to stop smoking was recorded more frequently, mainly before the index event. More than 80% of the persistent smokers had made an attempt to stop smoking: one third tried reduction and 20% used additional help such as nicotine substitution. In the patients who stopped smoking, almost 90% totally abstained from smoking immediately.

Of the total of 554 patients who were smoking at the time of the interview, 512 patients reported that they had received advice to stop smoking (92%). In 64% of the patients - mainly those who underwent an intervention - the advice was given before the index event, and in only 31% patients - mainly those who had an acute ischaemic syndrome - during hospitalisation. The advice was given to 70% of the patients by the hospital doctor, and by the general practitioner to 50%. No significant differences in characteristics were found in patients who received advice to stop smoking and those who did not. 114 patients (21%) had sought help to stop smoking, mostly before the event (69%). Help was asked mainly from the hospital doctor and the general practitioner (30% and 47% respectively). A positive relationship was found between receiving advice and seeking help to stop smoking ($p < 0.001$).

457 patients (83%) had attempted to stop smoking in the past: 45% of these tried to abstain, 35% tried to reduce and 16% used nicotine substitution. A positive relationship was found between receiving advice, seeking help ($p < 0.001$), and attempting to stop smoking ($p < 0.001$).

Current non-smokers

Of the 3,015 patients who stated at the interview they were non-smokers, 2,056 (68%) had been smokers at some time before the interview; thus, 2,610 (73%) of the interviewed patients had a positive smoking history. Patients, who had smoked in the past, had the same characteristics as current smokers. The median length of time since they had stopped smoking was 48 months (interquartile range 21 to 180).
The other major coronary risk factors (hypertension, diabetes and family history of coronary artery disease) had a higher prevalence in never smokers than in smokers, but hyperlipidaemia, known as adversely affected by smoking, was mostly seen in smokers (Table 4). Ex-smokers had an intermediate prevalence of risk factors.

Table 4 *Prevalence of other coronary risk factors in interviewed patients (%).*

	All patients		smoker	ex-smoker	never smoker
n =	3,569	(%)	554	2,056	959
Hypertension*	1,892	53	49	51	59
Hyperlipidaemia†	1,212	34	50	42	45
Obesity§	900	25	24	25	26
diabetes	641	18	14	18	21
family history of CAD	1,812	51	50	51	56

* *SBP ≥ 140 mmHg or DBP ≥ 90 mmHg*

† *total cholesterol ≥ 5.5 mmol/l*

§ *BMI ≥ 30 kg/m²*

Discussion

Registration of smoking status, as assessed in this survey, is far from optimal. For 896 patients (18%), no entry could be found in the medical record, on smoking behaviour at any time before the index event; in 442 of the non-smokers (17%) no information on a history of smoking was recorded. According to the recommendations on prevention of coronary heart disease of the European Society of Cardiology[13] and the Guidelines on acute myocardial infarction,[12] much effort should be devoted to smoking cessation. Support and advice is needed during cardiac rehabilitation and a smoking cessation protocol should be adopted in every hospital. To assess a patient's risk, information about current smoking and a history of smoking should be entered in every medical record. In addition, to evaluate future risk factors, recording of past smoking is important, in case of a relapse. Even so, the percentage of registration of smoking is higher than any other monitored coronary risk factors. Registrations of risk factors in other studies were similar: 89% in 258 medical records of patients who underwent a bypass operation and 90% in 112 patients admitted for acute chest pain syndromes.[14,15]

In both studies, registration of smoking had the highest prevalence of all coronary risk factors. The actual attention paid to smoking behaviour may have been higher, because the topic, although raised during the consultation, may not have been recorded. This is to be expected, in non-smokers in particular. The number of ex-smokers at the interview confirms this assumption. This exceeds the number of pre-event ex-smokers plus the quitters at interview. About 155 of the 442 non-smokers, whose pre-event smoking history was unknown, were ex-smokers, so the majority had never smoked. Those undergoing coronary intervention were more frequently asked about their smoking behaviour than those admitted for acute ischaemia or myocardial infarction, while those who underwent an acute ischaemic syndrome smoked more. Presumably, patients with the highest risk of coronary complications and the highest expected gain from smoking cessation are more likely to be asked about their smoking habits; they may also have had a longer medical contact. Post-event registration of smoking status was present in only 35% of all pre-event smokers. Consequently, in 65% of the smokers the unhealthy behaviour has been ignored. It is most probable that these patients have not changed their behaviour, and therefore this 'no change' is not recorded, which means that the patient is still smoking. It is also possible that the subject of smoking has not been raised again.

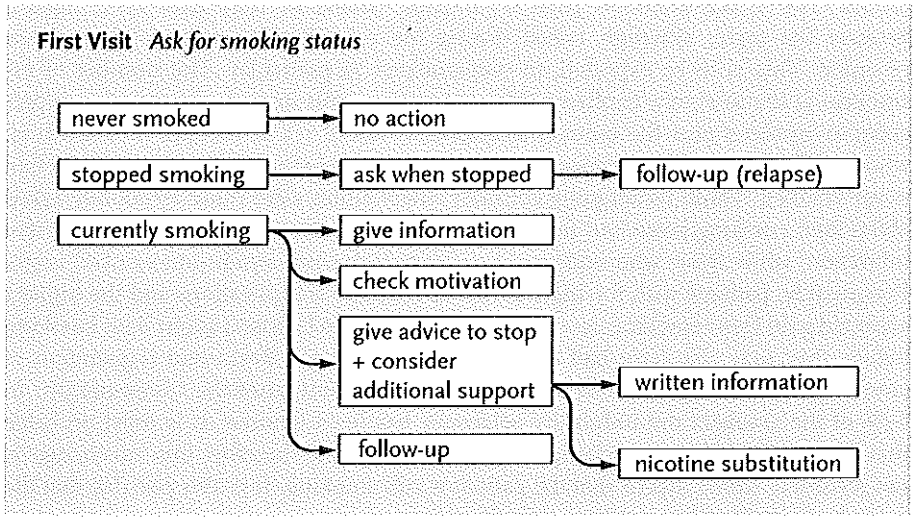
Smoking behaviour

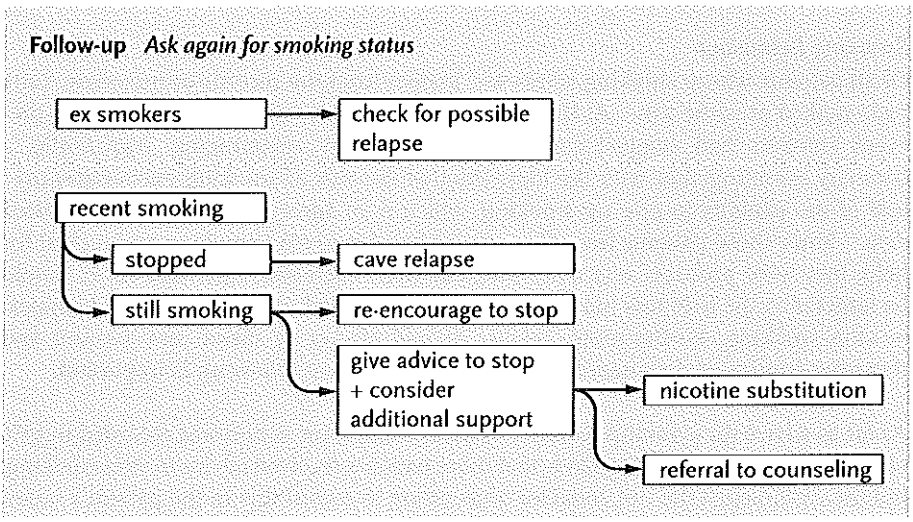
Of all patients whose smoking status was known from the records or interview, 3293 had smoked at some time. At the time of the interview, 560 (59%) of the 946 pre-event smokers had stopped smoking, which is very encouraging. Apparently, a coronary event together with the knowledge of the risk of smoking encourages over half of the patients to give up smoking, which is in agreement with other reported data.[57] Since these patients less often received advice to stop smoking and looked for help, they were probably very determined to stop. Therefore, time and effort should be targeted at the 41% less motivated patients, who need more attention and support to stop smoking. Furthermore, relapse should always be taken into account and therefore continued documentation of smoking status at follow-up is important.

As far as advice for smoking cessation is concerned, some action was recorded in 57% of the smoking patients. It is likely that more patients received advice to stop smoking, but the cardiologist did not consider it necessary to record this in the patient's notes. The result at interview, that 92% of the current smokers had received advice to stop smoking, confirms this. According to the recommendations of the Task Force on prevention in coronary heart disease, a physician's firm advice to stop smoking is of crucial importance to start the smoking cessation process, particularly at the time of diagnosis of coronary artery disease. Referral to a specialised smoking cessation intervention is very low (9%). Since offering help to stop smoking is time-consuming, referral to a special cessation program offered by, for example, a nurse or health counsellor could be efficient,[16] but it is still very important for the cardiologist to give repeated advice about the importance of stopping smoking.

There were striking differences among the various countries for pre-event recording of smoking behaviour, with Spain (97%) and the Hungary (66%) at the extremes.

Figure 2 *Recommendations for actions to be taken for smoking patients.*





Since only between one to three hospitals were included per country, differences between the various countries should be carefully interpreted. Differences may be attributed to different policies in the various hospitals, rather than countries. Dissimilarities between hospitals in these countries could be ascribed to differences in professional behaviour, professional society or national guidelines, government policy and cultural and economic differences.

Study limitations

Since only few hospitals per country were included, conclusions could not be extrapolated to the countries as a whole. Of the 4,863 patients included, 3,569 attended the interview. As shown in the results, patients not attending the interview

had different characteristics. They were more likely to be female, to have been hospitalised for an acute myocardial infarction or ischaemia, and to have no past history of coronary heart disease. More pre-event smokers did not attend the interview. Patients were enrolled at least 6 months after the index event. Pre-event information obtained from the medical record is more reliable for patients who underwent an intervention, since in patients admitted with a myocardial infarction or an acute ischaemic episode, less pre-event information will be available. Results concerning the attempt to stop were not dated, so no relationship to the coronary event can be given.

Conclusion and perspective

An attentive attitude by the cardiologist with regard to smoking behaviour and intensive support to quit smoking is recommended (Figure 2). Although recording in the medical notes was good, improvement is still desirable, particularly in relation to post-event recording of smoking habit. The importance of raising the subject of smoking should be reflected in the need to record this information. Patients who are known to be smoking should be followed and repeatedly reminded and motivated, otherwise, they could mistakenly draw the conclusion that the need to change behaviour is no longer recommended. Attempts to quit smoking immediately are more likely to succeed than a gradual decrease in the number of cigarettes, thus patients should be encouraged to stop completely. In 3-5% of the patients, insistent motivation by the specialist or general practitioner can help the patient to change his lifestyle.[17] Smoking intervention programs, in addition to physician advice, can improve these results with 70% quitting smoking as a result of an intervention group vs. 53% in a normal care group[18] and 62% quitting smoking in an intervention group vs. 51% in a cessation advice only group.[19] Although, for some patients, the physician's advice to stop smoking is in itself sufficiently effective, more support should be offered to other patients. Smoking cessation interventions conducted by, for example, a nurse, offer an effective and cost-effective tool for coronary patients during hospitalisation as well as for ambulatory patients.

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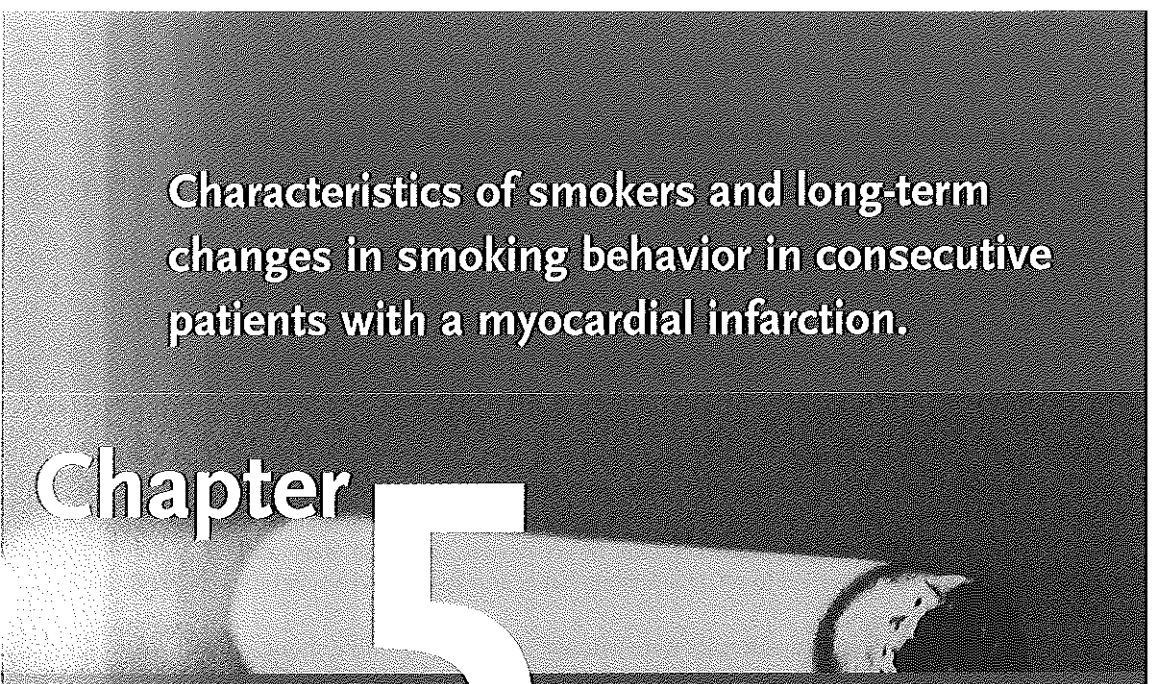
Blanco

Characteristics of smokers and long-term changes in smoking behavior in consecutive patients with a myocardial infarction.

Chapter 5



Summary

Aims Prognosis of patients with established coronary artery improves if smoking is stopped. Still, about half of patients who suffer a myocardial infarction continue smoking after that event. In order to predict to whom additional support should be offered, various baseline characteristics were compared with smoking status at short-term and long-term follow-up.

Methods Demographics, medical history, presence of coronary risk factors, psychological determinants and the clinical course were recorded in a group of 530 unselected consecutive patients who had been admitted with a myocardial infarction and were smoking. Patients who were smoking at admission, and who were alive at 4 year follow-up, were studied to relate smoking status and baseline characteristics.

Results At 3 months, persistent smokers were younger than quitters, were shorter admitted to the hospital, underwent less often revascularisation procedures, smoked more cigarettes per day at baseline and were more socially isolated. After 4 years, patients who stopped smoking had a larger myocardial infarction and a lower displeasure-score than those who continued smoking. Also, quitters received more support from their social environment.

Conclusion Although the majority of the patients try to stop smoking after a myocardial infarction, about half smokes after 4 years. In the future, special support should be offered to smokers who underwent a myocardial infarction, especially to those whose psychosocial profile are less favorable.

Introduction

Many epidemiological studies have shown an increased risk of coronary artery disease among smokers.[1,2] Furthermore, prognosis of patients with established coronary artery disease is impaired if smoking is continued, and improves if smoking is stopped. Patients who continue smoking after a myocardial infarction have a 35% increased risk of re-infarction or death within the first decade compared to those who refrain from this hazardous behavior (25% vs. 17%).[3]

Hospitalization and the diagnosis of coronary heart disease are predictors of smoking cessation in a general population.[4] Indeed, about half the patients who suffer a myocardial infarction, stop smoking after that event. The other half who continue smoking should be offered more support to stop their habit. In order to offer effective support to those who continue smoking after a coronary event, insight into factors which predict smoking cessation or continuation is needed. The objective of this study was, to compare demographic, clinical and psychological characteristics of smokers to non-smokers in 1,472 consecutive patients who were admitted with a myocardial infarction. Predictors of smoking cessation by coronary patients are summarised in Table 1. In previous publications, focus was often limited to either demographic, clinical or psychosocial determinants in a relatively small number of patients. The present study examines all these aspects in combination. Moreover, in the majority of former studies follow-up was limited to one year whereas in this study patients were followed for 4 years. Differences between patients who stopped smoking at short-term and long-term follow-up, and those who continued smoking were studied. Finally, determinants of continued smoking cessation were investigated in relation to relapse after short-term quitting.

Methods

A group of 1,472 unselected consecutive patients who had been admitted with a myocardial infarction between May 1993 and October 1995 to four different hospitals in Rotterdam, the Netherlands, was studied.[5] Demographics, medical history, presence of coronary risk factors, and the clinical course of all patients were recorded. At hospital day 5, the Heart Patients Psychological Questionnaire (HPPQ) was presented to most patients, measuring wellbeing (score 12-36), feeling of being disabled (score 12-36), displeasure (score 10-30) and social isolation (score 6-18).[6] At 3 months follow-up, data on complications, such as re-hospitalization and coronary intervention, smoking and medication were collected from the medical records.

For the present study, a 4 year follow-up of survival was performed by inquiries at the register offices for all 1472 patients. Patients who were smoking at admission or had smoked during the year before the hospitalization and who were alive at follow-up, were asked by mail to complete a postal survey. Those who did not respond were sent a reminder. The postal survey consisted of several psychological questionnaires, measuring anxiety, depression, fatigue, vigor, tension, anger, somatisation of neurotic complaints and vital exhaustion. (Appendix I) Furthermore, questions about attitude, social influences and self-efficacy (ASE model)[7] regarding smoking cessation were asked. Grade of nicotine addiction was measured by the Fagerström

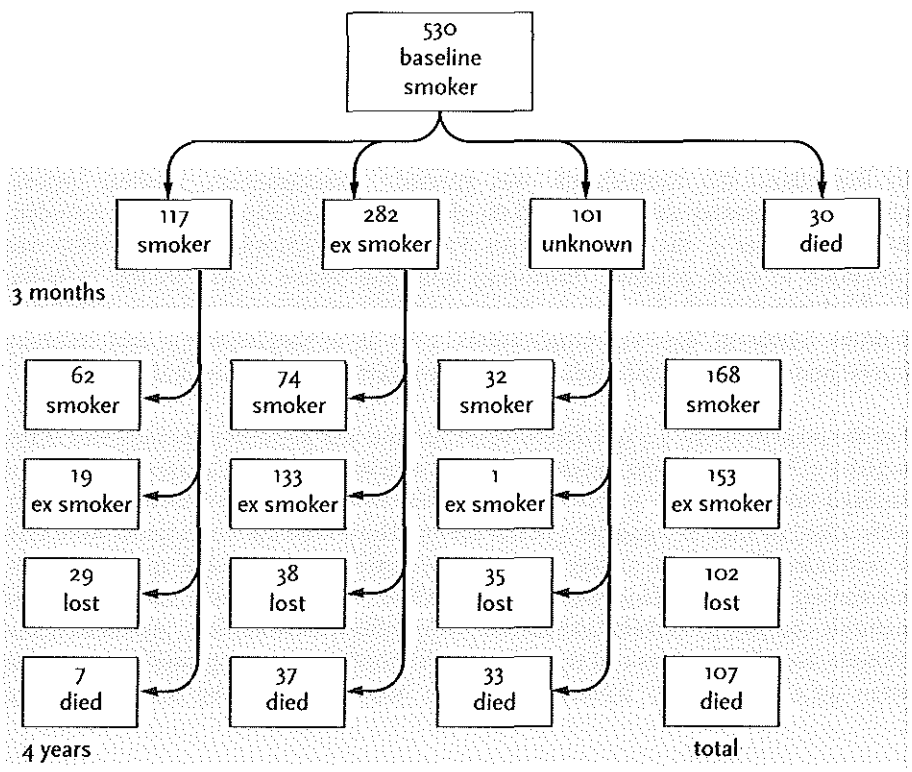
Questionnaire (range 0 to 10).[8] Finally, cardiac events which had occurred after hospitalization were collected.

In order to predict which smokers will or will not stop of their own accord after being admitted for a myocardial infarction, and to whom additional support should be offered, various baseline characteristics were compared with smoking status at short-term and long-term follow-up. Comparisons of differences in baseline and outcome variables between the groups were performed by a Chi-square analysis for nominal variables, a Mann Whitney test for ordinal variables and a T-test for continuous variables. An analysis of variance for repeated measures was used for the mean number of smoked cigarettes. Multivariable analysis on survival was performed by Cox regression analysis, and on smoking cessation by logistic regression analyses including independent variables which appeared to be significant in univariable analyses. Differences were considered statistically significant at the 0.05 probability.

Results

Figure 1 shows the smoking habits of all 530 (36%) baseline smokers with regard to survival and smoking behavior. Of the 530 baseline smokers, 107 smokers had died and 10 patients could not be traced, on average 3.8 years after the myocardial infarction. The remaining 413 smokers were invited to participate in the study, to which 77 (18%) patients did not respond. Of the 336 responders, 59 (18%) patients did

Figure 1 *Smoking habits at short-term and long-term follow-up*



not want to participate. Reasons for not participating were: not motivated (n = 36), language problem (n = 1), otherwise (n = 5) and no reason given (n = 17). 277 Patients were willing to participate and were sent a questionnaire. Fifty-one patients were sent a reminder. 260 (63%) of the potential 413 patients returned the questionnaire, and 61 patients reported their smoking status via the returned letter.

Table 1 *Characteristics of baseline smokers and non-smokers (n=1,472) (Percentages given unless otherwise specified)*

	smokers	non-smokers	P
n =	530	942	
Socio-demographic			
Male	79	63	< 0.0001
Mean age (years)	59	69	< 0.0001
Partner	78	72	0.045
Occupational state (working)	48	28	< 0.0001
Medical history			
No coronary history	74	69	0.02
AP < 4 weeks	8	6	ns
AP > 4 weeks	14	15	ns
AMI	24	28	0.052
CABG	5	5	ns
PTCA	5	5	ns
hypercholesterolaemia	24	15	< 0.0001
hypertension	25	27	ns
diabetes	8	16	< 0.0001
Body mass index (kg/m2)	26	26	ns
Other illnesses*	23	23	ns
Physical active	57	37	< 0.0001
Medication (%)			
Acetylsalicylacid	12	14	ns
ACE-inhibitors	5	9	0.009
Beta-blockers	11	13	ns
Cholesterol lowering	4	3	ns
Hospital stay			
CPK maximum (CPK-MB)	1422 (112)	992 (82)	< 0.0001
Thrombolytics	51	34	< 0.0001
Intervention	27	20	0.006
Duration (days)	12	11	0.025
Psychology			
Well being	23	23	ns
Feeling of being disabled	24	24	ns
Displeasure	16	15	ns
Social isolation	11	11	ns

AMI = acute myocardial infarction; CABG = coronary artery bypass graft; PTCA = percutaneous transluminal coronary angioplasty

* *Any illness mentioned by the patient or reported in the medical record*

Comparison of baseline smokers and non-smokers

At the moment of admission, the average age of smokers was ten years under that of non-smokers (table 1): 59 vs. 69 years respectively ($p < 0.001$). Smokers were more often male (79% vs. 63%), had more often a high cholesterol level (> 5.5 mmol/l; 24% vs. 14%), had less often diabetes (8% vs. 15%) and were more often physically active (59% vs. 37; all $p<0.0001$) than non-smokers. Of the 530 smokers, 20% had died after 4 years, as opposed to 40% (375) of the 942 non-smokers (survival smoking RR 2.2, 95% confidence interval 1.8 to 2.8).

After multivariate adjustment for differences in baseline characteristics, smoking appeared not to be an independent determinant for mortality (age-adjusted survival RR 1.1, 95% confidence interval 1.0 to 1.5), while age (RR 1.1), peak CPK (RR 1.0), physical activity (RR 1.3), previous myocardial infarction (RR 0.7) and co-morbidity (RR 0.7) were all independently significant.

During hospitalization, smokers suffered a larger myocardial infarction, received more often thrombolytic therapy, and underwent more coronary revascularisations; moreover they were admitted for a longer period. Psychological profile was similar for smokers and non-smokers.

smoking behaviour after 3 months

At short term follow-up, on average 111 days after admission, 14% (103) of the 764 patients whose smoking status was known were smokers. Of 399 baseline smokers, smoking status was traced (30 had died, 101 unknown). Seventy-one percent (282) of the baseline smokers had quit smoking, while 8 of the non-smokers had started smoking. Persistent smokers were younger than quitters, were in hospital for a shorter period, underwent revascularization procedures less often, smoked more cigarettes per day at baseline and were more socially isolated (Table 2). Logistic regression showed social isolation as a significant independent predictor for short-term smoking cessation (RR 1.1, 95% confidence interval 1.0 to 1.2).

Smoking behaviour after 4 years

At 4 year follow-up, 321 of the 423 surviving baseline smokers had reported their smoking status, either by completing the questionnaire ($n = 260$) or by filling in their smoking behavior on the returned letter ($n = 61$); 52% (168) was still smoking. (Table 3) Of the patients who stopped smoking, a quarter had stopped on the day of admission, one third in the month preceding or following admission, one tenth before and a quarter after that period.

Patients who stopped smoking had a larger myocardial infarction (CPK-levels 1524 vs. 1,178; RR 1.0, 95% confidence interval 0.9 to 1.0), and the displeasure-scale of the HPPQ was higher in those who continued smoking (17 vs. 15; RR 1.1, 95% confidence interval 1.0 to 1.1). Both variables were independent predictors for long-term smoking cessation.

Table 2 *Baseline characteristics according to smoking status at short term follow-up.*

	died	quitters	smokers	unknown	P *
n =	30	282	117	101	
Duration of follow-up (days)	32	110	115	-	ns
Socio-demographic					
Male	83	78	84	76	ns
Mean age (years)	68	59	56	59	0.042
Partner	72	80	76	88	ns
Occupational state (working)	33	51	49	44	ns
Medical history					
No coronary history	40	79	76	70	43
AP < 4 weeks	10	9	10	5	ns
AP > 4 weeks	20	12	15	17	ns
AMI	60	20	21	21	ns
CABG	17	5	4	3	ns
PTCA	7	3	2	8	ns
hypercholesterolaemia	30	17	22	34	0.071
hypertension	33	25	21	27	ns
diabetes	13	9	6	8	ns
Body mass index (kg/m²)	25	26	26	25	ns
Other illnesses	43	18	22	24	ns
Physical active	63	52	56	66	ns
Medication (%)					
Acetylsalicylacid	23	12	14	12	ns
ACE-inhibitors	7	3	10	6	0.077
Beta-blockers	13	12	10	12	ns
Cholesterol lowering	7	3	3	8	ns
Hospital stay					
CPK maximum (CPK-MB)	2,112 (84)	1,468 (86)	1,234 (70)	1,316(76)	ns (ns)
Thrombolysis	50	54	48	47	ns
Intervention	23	29	18	32	0.025
Duration (days)	15	12	10	11	0.01
Smoking					
# cigarettes per day	21	18	25	16	<0.001
Psychology					
Well being	24	24	23	21	ns
Feeling of being disabled	27	24	24	24	ns
Displeasure	15	16	17	17	ns
Social isolation	11	11	12	10	0.022

AMI = acute myocardial infarction; CABG = coronary artery bypass graft;
PTCA = percutaneous transluminal coronary angioplasty

* *Tested between quitters and smokers, p-values < 0.1 are shown.*

Table 3 *Baseline characteristics according to smoking status at long term follow-up.*

	died	quitters	smokers	unknown	P *
n =	107	153	168	102	
Duration of follow-up	1.3	3.9	3.9	3.9	ns
Socio-demographic					
Male	77	84	76	82	0.074
Mean age (years)	67	58	57	55	ns
Partner	6	84	80	75	ns
Occupational state (working)	29	50	51	60	ns
Medical history					
No coronary history	59	83	77	74	ns
AP < 4 weeks	12	7	8	5	ns
AP > 4 weeks	12	16	14	14	ns
AMI	40	14	21	24	ns
CABG	11	1	3	9	ns
PTCA	6	5	4	3	ns
hypercholesterolaemia	25	21	27	21	ns
hypertension	32	26	22	22	ns
diabetes	10	7	5	13	ns
Body mass index (kg/m^2)	25	26	26	26	ns
Other illnesses	41	14	23	15	0.059
Physical active	62	57	59	51	ns
Medication (%)					
Acetylsalicylacid	19	11	12	8	ns
ACE-inhibitors	6	5	4	5	ns
Beta-blockers	13	10	11	13	ns
Cholesterol lowering	3	3	4	7	ns
Hospital stay					
CPK maximum (CPK-MB)	1,655 (87)	1,524 (91)	1,178 (68)	1,430 (81)	0.026 (ns)
Thrombolytics	46	56	51	49	ns
Intervention	25	29	24	28	ns
Duration (days)	14	11	11	11	ns
Smoking					
# cigarettes per day	15	19	20	24	ns
Psychology					
Well being	23	25	23	21	0.070
Feeling of being disabled	26	23	24	24	ns
Displeasure	16	15	17	17	0.016
Social isolation	11	11	11	10	ns

AMI = acute myocardial infarction; CABG = coronary artery bypass graft;
PTCA = percutaneous transluminal coronary angioplasty

* *Tested between quitters and smokers*

Table 4 *Characteristics at follow-up quitters and persistent smokers (n=260).*

	quitters	smokers	P
n=	127	133	
Duration of follow-up (years)	4.0	4.0	ns
Smoking history			
# cigarettes at baseline	19*	13	< 0.001
# years	44	43	ns
Previous attempt to quit (%)	41	70	< 0.001
Mean number of attempt(s)	4	4	ns
Attitude	15	9	< 0.001
Self-efficacy	13	-16	< 0.001
Social influence			
Smoking environment	-1	1	< 0.001
Stimulus	6	4	< 0.001
Psychological characteristics			
ABV-Somatisation	19	20	ns
Anxiety			
ZBV	51	52	ns
HAD	5	7	0.019
Depression			
HAD	4	5	< 0.001
S-POMS	3	6	0.02
Anger (S-POMS)	5	7	0.013
Fatigue (S-POMS)	4	6	0.009
Vigor (S-POM)	12	11	ns
Tension (S-POMS)	4	6	0.032
Total Mood (S-POMS)	25	33	0.003
Vital exhaustion (MQ)	15	17	0.099
Cardiac events since admission			
Re-infarction (%)	6	7	ns
PTCA (%)	16	6	0.011
CABG (%)	15	10	ns

HAD = Hospital Anxiety and Depression scale;
S-POMS = 'Shortened' Profile of Moods States;
ZBV = Zelf Beoordelings-Vragenlijst';
ABV = 'Amsterdamse Biografische Vragenlijst';
MQ = Maastricht Questionnaire

* *Number of cigarettes smoked daily before quitting*

Relapse

Smoking status of 207 patients out of the 282 short-term quitters was known after 4 years: 37 patients had died and 38 patients' long-term smoking status was unknown; 74 (36%) patients had relapsed (Figure 1). Predictors for relapse were not detected in this study. Those who continued or relapsed smoked less cigarettes per day. For patients whose number of smoked cigarettes was known at more than one point of time, the number of cigarettes was significantly lower after 3 months (11 vs. 27, $p < 0.0001$) and after 4 years (12 vs. 20, $p<0.0001$) than at baseline, and also the increase between 3 months and 4 years follow-up was highly significant (9 respectively 14, $p < 0.0001$).

Differences between quitters and persistent smokers (retrospective)

260 of the surviving baseline smokers completed the questionnaire. Responders differed from those who did not respond only with respect to gender: 66% of the men returned the questionnaire and 53% of the women ($p < 0.05$). Almost half (127) of the 260 participants had stopped smoking (Table 4). Patients who had stopped smoking had undergone an angioplasty more frequently than those who continued ($p = 0.011$). Almost 60% of the quitters had made no previous attempts to stop. 70% of the persistent smokers had ever attempted to stop smoking; 28% had made an attempt in the last year.

The smokers had more often smokers in their environment and received less support from them. In particular the persistent smokers' partner, family and friends smoked more often than those of quitters did (Figure 2). In contrast, quitters experienced more support from their partner, cardiologist, family and colleagues than persistent smokers (Figure 3). Seventy-nine percent of the patients did not know whether the cardiologist smoked.

A positive attitude towards smoking cessation was lower in persistent smokers, especially because of feelings of anger, stress, and gloom, and the fear of withdrawal symptoms (all $p < 0.001$). Self-efficacy was stronger in quitters, which means they are fairly certain they will not light a cigarette in difficult situations. In contrast, persistent smokers had a negative self-efficacy which means they do not think they will be able to refrain from smoking, for example, during stress, after dinner or when other people are smoking. Also, they had significantly higher levels of anxiety and depression, fatigue, anger, tension and total mood disturbances. Vital exhaustion was higher in patients, who continued smoking, although not significantly so.

The grade of addiction was 3. The average answer of the smokers to the question concerning intention to stop smoking was 'maybe yes, maybe no' (0, range -3 to 3); the average answer to the patients' plan about smoking cessation was 'not to stop within the next 5 years' (5, range 1 to 7).

In a multivariate analysis, the number of cigarettes smoked at baseline, previous attempts, attitude, self-efficacy, depression and fatigue were independent predictors; the C-index for the smoking cessation model was 0.949, reflecting good ability to discriminate between patients who did and did not stop smoking after four years.

Figure 2 *Percentages of patients of whom at least half of the environment (children, family, friends and colleagues) smoked, or whose partner smoked.*

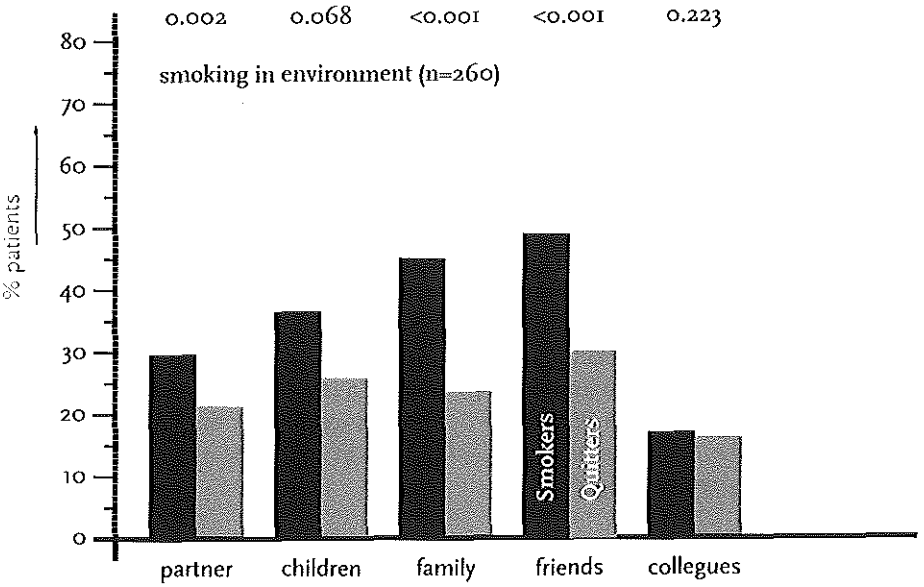
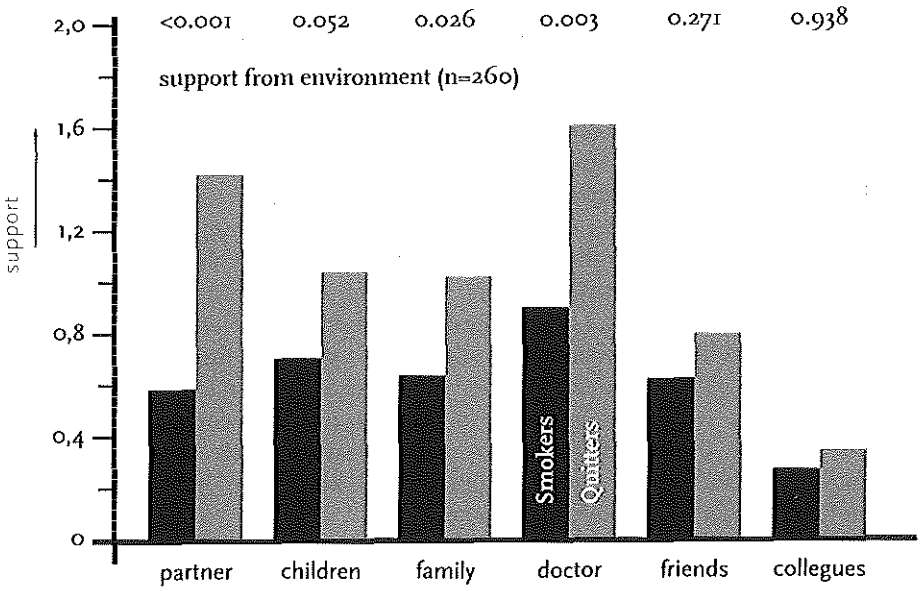


Figure 3 *Percentages of patients according to the quantity of support they received from their environment. In each group the first column represents the smokers and the second column the quitters.*



Discussion

Smokers' Paradox

Survival after 4 years was higher in those who smoked at baseline; the so called 'Smokers' Paradox'.[9] Smokers, however, had their myocardial infarction on average 10 years earlier than non-smokers (59 vs. 69 years), which largely explains the apparent favorable effect of smoking.

Smoking

Percentages of smoking, 36% at baseline and 14% at 3 months follow-up, are within the ranges found in other publications.[3] The number of quitters at three months follow-up, 71%, was very encouraging. Unfortunately, after 4 years, less than half of the smokers remained ex-smokers, while one third had resumed smoking after short-term quitting. Thus, although suffering a major event, such as a myocardial infarction, induces many patients to attempt to stop smoking, a large proportion does not maintain this behavior. Since it is difficult to become an ex-smoker, due to the addiction of nicotine and the psychosocial impact, more support should be offered to encourage quitting and to prevent relapse.

Short-term and long-term predictors

All short-term predictors found in the present study, were confirmed, either at short-term or long-term, in some earlier published studies. (Table 5) Differences among these studies are likely to be caused by insufficient power. Only one study[10] reported lower age to be predictive for smoking cessation in contrast to most other publications, including the present, where a higher age was associated with higher cessation rates.

A larger myocardial infarction and lower levels of displeasure were predictors for long-term smoking cessation. Patients who are aware of the seriousness of their illness are more likely to be inclined to improve their prognosis, and are probably more frequently urged to stop by their cardiologist. Patients with a smaller infarction might trivialize their illness, so the importance of smoking cessation should be emphasized also to these patients. Displeasure, which is related to depression, was found in several articles to be predictive for short-term continued smoking; but was not measured in long-term studies. Different predictors were detected at short-term and long-term follow-up. The short-term predictors, such as an intervention and the number of days hospitalized, were more often related to the motivation to attempt to quit smoking. The extent of the infarction apparently makes a profound impression and predicts long-term smoking cessation, together with psychological factors, such as anxiety and depression, which are important to maintain this behavior. In the reviewed studies in Table 5, also other variables were measured, such as other coronary risk factors, health locus of control, health and risk knowledge, but these were not proven to be predictors of smoking cessation.

Differences between quitters and persistent smokers

Retrospectively, smoking by significant others had an adverse effect on patients trying

Table 5 Review of smoking cessation predictors in coronary patients (ordered by diagnosis).

Diagnosis	Follow-up	n	age	male	relation	SES	# cig	attempt	Hx	# days	severity	revasc	env.	A,S-E	psych.
Coronary Angiogram															
Ockene et al.[20] *	6 months	267	-	↑	-	-	-	-			↑			↑	
	12 months		-	-	-	-	-	-			↑			↑	
Frid et al.[21]	11 months	84	↑	-			-	-			↑	↑			
Coronary heart disease/ischemia															
Rice et al.[12]	1 month	137	-	-									↑		
	6 months		-	-									↑		
	12 months		↑	↑									↑		
Rice et al.[22] *	1 year	255	↑	↑	↑	↑	-				-		-		
Ockene et al.[23]	?†	104	↑			↑	-						-	-	-
Acute myocardial infarction															
Baile et al.[24]	In-hospital	66	-	-			-			↑	↑	-			
Greenwood et al.[25]	1 months	532	-	-	↑	↑		↑						-	↓
Huijbrechts et al. [26]	5 months	164	-	-	-	-									↓
Havik et al.[27]	6 months	230	-		↑				-		↑				↓
	43 months		↑		-				↓		↑				-
Herlitz et al. [10]	1 year	217	↓	-					↓		-				
DiTullio et al. [28]	18 months	80	-	-	-	-			-	↑	↑				
Present Study															
	3 months	530	↑	-	-	-	↓	-	-	↑	-	↑	-	-	↓
	4 years		-	-	-	-	-	-	-	-	↑	-	-	-	↓
Revascularisation															
Crouse et al.[29] ‡	1 year	135	-				-				-	↑			
Bass et al.[30]	1 year	78					-		↑						↓
Rigotti et al.[31]	1 year	87	-	-		-	-	↓		-	-		-	↑	↓
	5.5 years		-	-		-	-	↓		-	-		-	↑	
Hasdai et al.[32]	5.1 years	1169	↑	-			↑		-		↑	-			

SES = Social Economic Status;
cig = cigarettes;
Hx = history of myocardial infarction or heart failure;
revasc = revascularisation intervention;
env = smoking and support of environment;
A,S-E = attitude and self-efficacy;
psych = psychological problems;

↑ = positively related (eg. higher age, more likely to quit)
↓ = negatively related (eg. more psychological problems, less likely to quit),
- = not significant

* Predictors of success of smoking cessation intervention
† Comparison between patients with first ischaemic event and those with earlier event
‡ bypass surgery, angioplasty or angiography alone

to quit. Cognitive psychological factors have shown to foretell whether patients are likely to stop smoking[11], but are often not included in smoking cessation interventions in clinical settings. Attitude, social influences and self-efficacy were found to be predictive in the current study as well. Awareness of the hazards of smoking and the health gains of smoking cessation are important and should therefore be explicitly notified by health care workers. Both positive and negative support are predictors for quitting respectively continued smoking.[12] In future, when advising patients to stop smoking, it would be advisable to involve the partner, and to make the environment aware of the importance of smoking cessation for coronary patients. Most patients were not aware of their cardiologist's smoking behavior. But still, in conjunction with the support of partner and family, the support of cardiologists - even when they smoke - proved to be a significant factor for quitters. Self-efficacy, the confidence of the patient to be able to stop, might be enhanced by appropriate support such as information leaflets and smoking cessation interventions. At baseline, no differences were found between smokers and non-smokers with regard to psychological parameters. Patients who still smoked after 4 years had higher baseline levels of displeasure, and had higher levels of anxiety and depression at follow-up than those who stopped smoking. Since anxiety was not measured at baseline, it is doubtful if we may conclude whether these patients had higher anxiety scores at baseline and therefore were not able to stop smoking.

Limitations

Follow-up was not complete in both short-term and long-term follow-up. Baseline characteristics of patients whose smoking status was unknown at short-term or long-term follow-up did not deviate from those patients whose smoking status was known. Information about short-term smoking was mainly collected from the medical files, which are known to be incomplete with regard to (follow-up of) smoking status.[13] But still, in conjunction with the support of partner and family, the support of cardiologists - even when they smoke - proved to be a significant factor for quitters. Self-efficacy, the confidence of the patient to be able to stop, might be enhanced by appropriate support such as information leaflets and smoking cessation interventions. At baseline, no differences were found between smokers and non-smokers with regard to psychological parameters. Patients who still smoked after 4 years had higher baseline levels of displeasure, and had higher levels of anxiety and depression at follow-up than those who stopped smoking. Since anxiety was not measured at baseline, it is doubtful if we may conclude whether these patients had higher anxiety scores at baseline and therefore were not able to stop smoking.[14]

Implications

Tobacco dependence is a chronic condition which needs a tailored intervention of varying intensity and duration. Computer-tailored smoking cessation interventions have proven to be a successful[15], and an addition for smokers who do not want to have or are not able to be present at counselling. An admission for an acute myocardial infarction or another cardiac event offers a great opportunity to draw the patient's attention to the necessity of smoking cessation. The imposed prohibition of smoking in the hospital provides an opportunity to stop smoking for every patient, so

withdrawal symptoms can be dealt with in the hospital setting using nicotine replacement therapy. At follow-up, simple advice to stop smoking proved to be insufficient for those who continued or relapsed into smoking. Meta-analyses by The Cochrane Library have shown that individual as well as group behavioural therapy is more successful than self-help. Municipal Health Offices often offer special smoking cessation programs, but in future, hospitals might offer special secondary prevention support. Extra attention and support should especially be offered to smokers who are younger, to those who have less severe cardiac disease and those with psychosocial problems. In case of the latter, referral to a counsellor could be the first appropriate step in order to change behaviour. Significant others, such as partner and family, are important in the smoking cessation process and should be informed and encouraged to support the patient. Furthermore, follow-up should be offered to all patients who have smoked in the past, since relapse often occurs. In this era of secondary prevention, every baseline smoker should be asked about his smoking behavior during each visit to the cardiology outpatient clinic after discharge. The Agency for Health Care Policy and Research (AHCPR) stated in their Smoking Cessation Clinical Practice Guideline major recommendations for health care workers: tobacco-user identification systems should be used in all clinics and smoking cessation treatment should be supported through dedicated staff education and training, changes in hospital policies, and the provision of reimbursement for tobacco-dependence treatment.[16] Nicotine replacement therapy has shown to be effective[17] and can be safely prescribed for coronary patients.[18] Recently, the antidepressant bupropion helped people to stop smoking[19], and might offer an additional tool to support patients stop smoking. More long-term support could be offered by the general practitioner who should be informed about the patient's smoking history in the discharge letter (Table 6).

Table 6 List of actions for patients admitted with an acute myocardial infarction

1 **Ask EVERY patient for smoking behaviour**

2 **Register patient as current smokers, ex-smoker or never-smoker**
- → If ex-smoker: ask when patient has quit, if recently, beware of relapse (see: smoker)
- → If smoker:
  - → inform patients (+ family) about hazards of (continuing) smoking
  - → advice strongly to stop smoking (also partner)
  - → prescription of nicotine replacement therapy (and/or bupropion)

3 **Ask current smoker AND ex-smoker AGAIN for smoking habits at outpatient visit**
- → If still smoking, consider:
  - → referral to smoking cessation intervention
  - → referral for specialised counselling if psychosocial problems are expected

4 **Record actions to be taken in medical record AND correspondence to GP**

Appendix I

Questionnaire	Variable	Range	Reference
Hospital Anxiety and Depression (HAD)	Anxiety	{0, 21}	(33)
	Depression	{0, 21}	
Profile of Moods States (POMS)	Fatigue	{0, 24}	(34)
	Vigour	{0, 20}	
	Tension	{0, 24}	
	Depression	{0, 32}	
	Anger	{0, 28}	
Zelf Beoordelings-Vragenlijst (ZBV)	Trait anxiety	{20, 80}	(35)
Amsterdamse Biografische Vragenlijst (ABV)	Somatisation	{11, 46}	(36)
Maastricht Questionnaire (MQ)	Vital exhaustion	{0, 46}	(37)
Fagerström Questionnaire	Addiction	{0, 10}	(8)
ASE - model	Attitude	{-24, 51}	(7)
	Social influences	{-18, 18}*	
		{- 6, 6}†	
	Self-Efficacy	{-78, 78}	

* *Smoking by partner, children, family, cardiologist, friends and colleagues*

† *Stimulus to stop smoking by partner, children, family, cardiologist, friends and colleagues*

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Blanco

A new smoking cessation program for coronary patients in the outpatient clinic.

Chapter 6

A baseline description and problems with inclusion.

Summary

Aims In spite of the higher risk of complications, half of the patients continue smoking after a coronary event. This article describes the options for a smoking cessation program in the cardiology outpatient clinic. The theory of smoking cessation interventions, problems with smoking cessation and tools to support patients to stop smoking are discussed.

Methods Several approaches have been described with respect to smoking cessation, of which four aspects, all applied in this study, require particular attention: motivation to change behaviour, the ASE-model, psychological parameters and the grade of nicotine addiction.

Results The study population included 248 men and 85 women, with a mean age of 55 years. Nineteen percent was in precontemplation, 22% in contemplation, 44% in preparation and 15% had quit during the last month. Those who had already quit smoking had been significantly more often admitted to the hospital during the month preceding inclusion. Eighty-five percent of the patients appeared to be motivated to come to the hospital for a smoking cessation. Thirty-five percent of the patients stated not to know whether cardiac complaints and pulmonary symptoms could be improved, or the risk of lung cancer decreased, by smoking cessation. Patients experienced the most encouragement to quit smoking from their cardiologist (84%), followed by their partner and children (both 63%).

Conclusion An important element of the intervention is to find out in which motivational stage of change the smoker is, in order to apply appropriate support. In the future, a smoking cessation program as described below could be offered in a more general prevention clinic.

Introduction

Cigarette smoking is one of the major risk factors for the development and progression of coronary heart disease (CHD).[1,2] Smoking cessation in the scope of secondary prevention improves the prognosis of patients with coronary heart disease to a large extent.[3] Still, about half of the coronary patients continue to smoke, and therefore strong smoking cessation support should be offered to these patients. Indeed, smoking cessation programs for coronary patients, have proven to be successful.[3] These programs, which were offered to patients who were hospitalised for a coronary event, might also be useful in an outpatient setting. To test whether coronary patients in the outpatient clinic could benefit from additional support to stop smoking, we started a smoking cessation program in the university hospital and three general hospitals in Rotterdam, the Netherlands. This paper describes the smoking population at the outpatient clinic and the experiences with the implementation of a smoking cessation program in this setting.

Background

Theory

Several approaches have been described with respect to smoking cessation, of which four aspects, all applied in this study, require particular attention: motivation to change behaviour, the ASE-model, psychological parameters and the grade of nicotine addiction.

In order to provide a patient with adequate information and support, it is important to find out in which phase a smoker is situated with regard to his or her motivation to change the smoking behaviour. The motivation to change undesirable behaviour, described by the Transtheoretical Model of Prochaska[4], which can also be applied to smoking cessation, can be distinguished in five stages: not considering to quit smoking in the next 6 months (precontemplation), considering to stop smoking within 6 months (contemplation), planning to quit smoking in the next month (preparation), attempt to quit smoking (action), and quit smoking for at least 6 months (maintenance). This model of smoking cessation has also proven to be valid in coronary patients who were scheduled for a coronary angiogram,[5,6] or admitted to a cardiology ward.[7] By determining the patient's motivational stage of change, information and support can be tailored to patient's readiness to change. Also, expected problems with smoking cessation should be explored; which component is more significant to the patient: the psychological and social (environment, internal) or the physical (nicotine addiction)?

Attitude, social influences and self-efficacy (ASE model)[8] are considered to be important psychosocial determinants of the intention to change behaviour. Attitude is comprised by a person's positive and negative beliefs about consequences of certain behaviour, the so-called pros and cons. Social influences consist of the perceived social norms of important others with regard to the behaviour in question, the support or opposition of these persons and the behaviour people perceive in their environment. Self-efficacy refers to a person's expectations regarding his capability to

realise the desired behaviour. In coronary patients, subjects in different motivational stages differ in their psychosocial determinants.[7] Patients who recognise disadvantages of smoking and advantages of smoking cessation, receive support from their environment and belief they are able to quit smoking, are most likely to stop smoking. Different aspects of cognition play a role in each motivational stage of change: in precontemplation, the pros and cons are important; in contemplation, self-efficacy; in the preparation phase, attitude and self-efficacy are both important; and in the maintenance phase, it is important to prevent relapse.[9] By measuring these determinants, more individual advice can be offered, for example by providing information about the health consequences of smoking cessation, involving significant others and offering guidance and tools to overcome difficult situations.

In order to investigate the psychological profile of smokers, the Hospital Anxiety and Depression scale,[10] the Shortened Profile of Mood States[11] and the Amsterdamse Biologische Vragenlijst - Neurotic Somatisation[12] were presented to smokers, to evaluate their probability of smoking cessation, and, if applicable, to take into account and incorporate in a smoking cessation program. Higher levels of the psychological parameters depression, anxiety and somatisation have shown to be related with continued smoking behaviour in patients five months after a myocardial infarction.[13]

Compared to other addictive substances such as heroin and cocaine, nicotine is equally addictive.[14] The grade of addiction to nicotine can be measured with the Fagerström Test for Nicotine Dependence containing six questions concerning smoking behaviour. Generally, patients who smoke at least 15 cigarettes per day and smoke their first cigarette within the first hour after awakening are addicted to nicotine and can benefit from nicotine replacement therapy, which doubles the change of quitting.[15]

Smoking cessation program

In the presently described smoking cessation program, two different methods of interventions were combined: a six-step so-called "Minimal Intervention Strategy" and a tailored letter.

In the Netherlands, a minimal intervention smoking cessation program was developed by the Department of Psychology, University of Twente, in collaboration with the Department of Health Education and Promotion, University of Maastricht. This intervention was successful in general practice (one-year follow-up: 18% quitters in the intervention group vs. 9% in the control group, $p < 0.01$).[16] In this specific individual program, a nurse assists the patient systematically in smoking cessation carrying out six steps: assessing the smoking profile, the motivation to quit smoking and expected barriers, setting a date to stop smoking, offering supporting aid and follow-up. After assessing the patient's stage of motivation, the appropriate next step was decided by the nurse (Table 1).

First of all, precontemplators need to become motivated to change, which is achieved by discussing pros and cons of smoking and smoking cessation. To this end, patients

are asked to think of their own solutions to overcome expected barriers. Subsequently, patients are asked to set a date to stop smoking, preferably within a fortnight. Supporting aid is offered by means of self-help brochures addressing attitude, social influence and self-efficacy information. A follow-up care is offered in order to prevent relapse, which is expected especially in the first month.[17] The patient received three phone calls from the nurse: two, four and eight weeks after the first visit and visited the nurse again after three months. The endpoint was smoking cessation one year after inclusion.

Table 1 *Flowchart for which step to take after assessing the stage of change (= step one).*

Stage of change →	Step to take →	Goal
Precontemplator	Motivation	To discuss pros and cons to increase motivation
Contemplator	Barriers	To think of solutions for difficult situations
Preparator	Set a date to stop	To make a 'commitment'
Actor	Supporting aid	To enhance the probability of a successful attempt
Maintainer	Follow-up	To prevent relapse

First step in each patients is to explore the 'Smoking Profile" which means to become informed of patient's smoking habits and stage of change. From this, the next appropriate step is decided.

In addition, the department of Health Education and Health Promotion of the University Maastricht has developed a software program, which generated tailored letters linked to the answers given in the self-administered questionnaire, presented at inclusion.[18] This software program was adjusted for cardiac patients specifically for this intervention. Items on smoking behaviour, stage of change, perceived outcomes and situational self-efficacy levels were converted to individual letters, relating to the answers given in the questionnaire, personalised by using patient's name, the amount of cigarettes and the number of years smoked.[19] In the letter, information was offered on favourable outcomes of smoking cessation such as positive consequences on health and the environment. Pros and cons of smoking and smoking cessation were restructured in order to increase motivation. Furthermore, skills and suggestions for coping with difficult moments and situations were presented, again tailored to the personal situation. Patients received this letter a week after filling in the questionnaire at home, before the visit to the nurse.

Important aspects to improve the efficiency of success rate of a smoking cessation program were to address all current smokers and recent quitters, and to offer an appropriate intervention. Cardiologists of the University Hospital Rotterdam were asked to systematically evaluate whether patients with established coronary artery disease had smoked during the month preceding the outpatient visit and whether they wanted to participate in the program. Simultaneously, letters informing the patient about the current program were sent out to all coronary patients who were going to visit this cardiology outpatient clinic the following week and who were not known to be non-smokers. Furthermore, three general hospitals participated in order to include also "common" coronary patients. After inclusion, patients were asked to fill in an

extensive questionnaire (including the four earlier mentioned aspects) and invited to visit a trained nurse at the outpatient clinic within a fortnight.

Results

A search through 2,794 medical records of coronary outpatients at the university hospital (not performed in the general hospitals), in order to locate smoking coronary patients and inform the cardiologist and patient about the program, revealed that in 22% of the records smoking behaviour was not mentioned. Only 11% of recorded patients were known smokers. Twenty-six percent of the 524 (861 letters sent; response rate 61%) responders were smokers, of whom almost 90% were willing to participate.

A total of 333 patients were included in the four hospitals, and subsequently randomised to either the smoking cessation intervention or the usual care. Of the coronary patients in the university hospital who were known to be smoking, but did not participate (n = 88), 2% did not speak Dutch, 21% responded positively, but did not return the questionnaire, 33% did not wish to participate and of 44% patients it was unknown why they did not participate. The study population included 248 men and 85 women, with a mean age of 55 years.

Results of the baseline characteristics are shown in Table 2. Nineteen percent was in precontemplation, 22% in contemplation, 44% in preparation and 15% had quit during the last month. Those who had already quit smoking had been admitted significantly more often to the hospital during the month preceding inclusion than the continued smokers. Eighty-five percent of the patients appeared to be motivated to come to the hospital for a smoking cessation. In this study, more patients who had quit in the last month were found among the patients who did not attend the first visit. Those who were in contemplation and preparation attended the first visit more often, but this difference did not reach a significant difference.

As far as attitude was concerned, lack of means to relax (91%) and cope with stress (59%), decrease of comfortableness (62%) and weight gain (54%) were mentioned as important disadvantages of smoking cessation, while improving general health and stamina (both 82%), improvement of health of others (84%) and saving money (85%) were mentioned as advantages of smoking cessation. Thirty-five percent of the patients stated not to know whether cardiac complaints and pulmonary symptoms could be improved, or the risk of lung cancer decreased, by smoking cessation. Patients thought it would be particularly difficult to refrain from cigarettes after diner and in stressful situations. With respect to social influences, half of the patients' partner smoked. Seventy-nine percent did not know whether their cardiologist smoked. Patients experienced the most support to quit smoking from their cardiologist (84%), followed by their partner and children (both 63%).

With regard to the psychological variables, coronary patients who smoke seemed to be more anxious not only than the general Dutch population, but also than patients admitted for a myocardial infarction.[13] Scores of depression and somatisation were not

Table 2 *Baseline characteristics of participants (n = 333)*

Socio-demographics		
Male (%)	75	
Mean age (years)	55	(±11)*
Partner (%)	81	
Mean number of years in school	11	(±3)
Smoking history		
Quit smoking preceding month	51	
Number of cigarettes smoked daily	15	(10-25)†
Number of years smoked	35	(29-44)
Nicotine Addiction (Fagerstrom) {0;10}	5†	(3-6)
Attempt to quit		
Last year	119∫	
Median number of attempts	2	(1-3)
Total	244	
Median number of attempts	3	(2-6)
Motivation stage of change		
Precontemplation	64	(19%)
Contemplation	71	(22%)
Preparation	142	(44%)
Action	51	(15%)
ASE-model		
Attitude {-24;51}	17	(8-25)
Self-efficacy {-78;78}	-3	(-19 - 13)
Social Influence		
Smoking environment{-6;6}	1	(-2 - 3)
Support {-18;18}	8	(3-11)
Psychological		
Depression		
HAD {0;21}	6	(2-8)
V-POMS {0;32}	3	(0-8)
Anxiety		
ZBV {20;80}	50	(48-53)
HAD {0;21}	8	(5-11)
ABV-Somatisation {11;46}	23	(17-28)

* *standard deviation*

† *interquartile range*

∫ *Only of those who did not quit smoking in the past month*

higher than this reference group. The median grade of addiction according to the Fagerström Questionnaire was 5 (interquartiles 3-6).

Discussion

Implementation and inclusion

In our program, we found that in one fifth of the medical files no smoking status is recorded, one quarter of the patients was still smoking and almost half of them did not consider to stop smoking in the near future.

Recently, the updated recommendations on secondary prevention of coronary artery disease stated that physicians should encourage and support their patients to stop smoking.[20] Awareness of the necessity of smoking cessation is an important step for both cardiologists and patients to change patients' smoking habits. Since relapse within the first months is considerable, presumed ex-smokers should also be asked implicitly for their current smoking habits. In one fifth of our reviewed medical records, no information with regards to smoking behaviour was found. This is congruent to findings of the Euroaspire I survey on registration and management of risk factors in coronary patients: most medical files (82%) revealed whether patients were smoking during hospitalisation for a cardiac event.[21] Furthermore, a quarter of the patients was self-reported smokers, although only one tenth were documented smokers. So the number of smokers is underestimated and registration of smoking status needs more attention. In large-scale trials for outpatients, a higher number of smokers were found. In the 4S-trial[22], among patients with coronary artery disease 26% were current smokers, and the CARE-trial[23], 16% were current smokers of patients with a myocardial infarction. A comparable prevalence of smoking was found in the outpatient population in the university hospital who underwent a thallium scan or stress echo (20%), and the self-reported 26% as mentioned earlier.

Smoking profile: stage of change

Nineteen percent of the patients were at the time of inclusion in precontemplation, 22% in contemplation, and 44% in preparation. Similar motivation levels were found in a smoking cessation program performed in the USA,[5] while cardiac patients showed to be more motivated to quit than people in the general population.[24] Even so, almost half of our patients did not intend to stop smoking within the next months. Nevertheless, the less motivated smokers were also willing to participate in a smoking cessation intervention. Total abstinence of smoking in these patients might be a bridge too far for these precontemplators, but consciousness-raising of the negative effects of smoking and providing information about smoking cessation to progress to the next stage, is a more realistic goal.

Increase motivation

One third of the patients indicated not to be aware whether smoking cessation would decrease their chance of further cardiac problems or lung diseases. This is unacceptably high. Providing convincing information is very important to achieve awareness and to enhance motivation. Physicians should not assume that patients are

aware of the hazards of smoking, but name these explicitly and or rather urge the patients to think of it themselves.

Overcome barriers

In order to offer optimal individual support, it is important to realise which component is most significant for this particular smoker: the psychological or physical (or a combination). In this program, these aspects were measured with the intention to relate them to changes in smoking behaviour and to formulate predictors for smoking cessation. Characteristics as described in the previous paragraph are often found in persistent smokers with coronary disease, and should be taken into consideration when a smoking cessation program is offered. Since smoking is considered by many smokers to be a means to relax or to cope with stress, substitution for relaxation should be offered. In some programs, but not this study, relaxation therapy by means of cassettes and breathing exercises is added. For some patients, smoking is considered as a manner to reduce feelings of anxiety or stress. Psychological support, counselling or anxiolytic therapy could be advised in serious cases. Also, anti-depressive therapy should be considered in patients with high scores of depression and depressive symptoms. The antidepressant bupropion resulted in higher long-term rates of smoking cessation in smokers, regardless of the levels of depression.[15] Weight gain, most often due to a transient increase in food consumption combined with the elimination of the acute metabolic effects of smoking, is for many people a disadvantage of quitting. On average, the weight gain is 3 kg for men and 4 kg for women - but weight gain over 10 kg is not exceptional - occurring mainly in the first months.[16] Weight control and, if necessary, a referral to a dietician, might be added to a smoking cessation program.

Half of the participating patients were moderately to very addicted to nicotine, shown by smoking early after awakening, the first cigarette being the most difficult one to give up, and experiencing difficulties when not able to smoke. Criteria for dependence according to DSM IV ('nicotine dependence', 350.10) are the same for nicotine as for other psychoactive substances such as cocaine and alcohol. They include: intake of larger amounts than intended, desire to cut down but making unsuccessful attempts, tolerance and withdrawal symptoms. When the physical addiction is a serious problem, indicated by the presence of withdrawal symptoms such as irritability, concentration problems, restlessness, anxiety and insomnia, nicotine replacement therapy should be considered.[15] Nicotine replacement therapy doubles the rate of smoking cessation, but should be preferably prescribed in addition to a behavioural smoking cessation program and accompanied by proper instructions how to use it.

Design of the intervention

The intensity of the program is difficult to establish and could be best discussed with the patient. In our study, the patient visited the nurse twice for the intervention, and once at one-year follow-up, and received three phone calls. Some patients were very difficult to reach or motivate to visit the nurse, others asked for more frequent calls or visits. Although the program should not be too time-consuming, a more attentive attitude especially in the beginning was desired by many patients. Especially for those

who are in (pre-) contemplation, this 'minimal' intervention was probably not sufficient. In order to improve the compliance and support, it is desirable that the nurse is flexible and approachable for the patients. In our program, the nurse was available only one morning or afternoon per week, which proved to be unsatisfactory for many patients.

Many different smoking cessation programs have been described.[27] Programs differed in modality and contents of program, setting, intervenor, use of additional information and materials, and duration of follow-up, individually/tailored. They varied from rehabilitation programs to very intensive smoking cessation interventions. Programs were mainly individual and offered by a nurse. Additional written information was distributed and sometimes other supporting materials as cassettes and videotapes were offered. Half of the studies offered follow-up telephone calls (varying from one telephone call to weekly calls) and the minority also involved family members. In general, smoking cessation interventions with a high number of contacts and prolonged duration are most successful. Furthermore, a multidisciplinary approach (cardiologist, nurse and possibly psychologist) with face-to-face contacts are determinants of success as well as the number of intervention modalities.[28] A review of smoking cessation programs consisting of advice to stop smoking from the cardiologist together with a nurse-supported smoking cessation programs showed, on average, 20% more quitters than when only the usual care is offered.[3]

In future, a smoking cessation program could be implemented in a broader prevention clinic, where also other risk factors are monitored such as lipids and blood pressure as well as dietary advice. For patients who, for example, live further away from the hospital, are less mobile, or have demanding jobs, it is preferred if the visit could be combined with other visits to the hospital, which makes it more worthwhile for them to attend the program. Also, more attention should be given to those who need more support to stop smoking. Since hospitalisation is associated with a period of no smoking, it is desirable to start a smoking cessation program at the ward and extend the follow-up at the outpatient clinic.

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Blanco

A smoking cessation intervention for patients with coronary artery disease in an outpatient setting.

Chapter 7

Efficacy and predictors for success.

Summary

Aims To investigate the effect of a smoking cessation program for coronary patients in an outpatient setting, and to predict smoking cessation on the basis of baseline smoking behaviour, and psychological and clinical factors.

Methods This randomised-controlled study, which was a single blind, multi-centre trial in which smoking status after one year was the primary endpoint. Patients who were randomised to the intervention received a tailored information letter and a nurse-offered minimal smoking cessation program.

Results Of the patients in the intervention group, 22% reported to have quit after one year vs. 20% of the control group. One third of the quitters had never attempted to quit before. They had more often quit already in the month before the inclusion, were more often recently admitted and diagnosed with coronary artery disease, and were more convinced to be able to refrain from smoking than continuing smokers. On the other hand, persistent smokers had more smokers in their environment and received less support from their close relatives and friends than quitters. Furthermore, patients who continued smoking had a less favourable psychological profile.

Conclusion For coronary patients who smoke a minimal smoking cessation program is not sufficient. A more extensive smoking cessation program, which takes psychosocial factors into account, might be more successful.

Introduction

In the last years, several studies have shown that smoking cessation considerably improves the prognosis of cardiac patients.[1] Smoking cessation after being diagnosed with coronary artery disease results in forty per cent reduction of early mortality or myocardial (re-) infarction.[2] In view of these promising figures, it is unfortunate that the majority of the smokers with established coronary artery disease persist in their hazardous behaviour.[3] To stimulate patients to stop smoking and to support possible attempts, smoking cessation programs have been developed. Various studies, mainly executed in a clinical setting, have shown that smoking cessation programs are effective[2] and cost-effective.[4]

We investigated the effect of a smoking cessation program for coronary patients in an outpatient setting in a randomised study design. In order to direct future smoking cessation interventions to those who would profit most from the program and to define groups who might benefit more from other type of interventions, such as psychological counselling or medication, we aimed to predict smoking cessation on the basis of baseline smoking behaviour, psychological and clinical factors.

Methods

Patient recruitment

Between February 1997 and May 1998, all consecutive patients with established coronary artery disease (i.e. a prior myocardial infarction, a prior coronary angioplasty or bypass operation, an abnormal angiogram (at least one-vessel disease with >50 % stenosis), or a positive stress or exercise test) who smoked daily in the preceding month, were eligible. Excluded were patients who did not speak Dutch, those who had a history of a serious psychiatric disease, as well as patients with a short life expectancy. Patients were recruited from one university hospital, three general hospitals and one cardiac rehabilitation centre in Rotterdam.

Inclusion

After written informed consent, the patients were randomly assigned: two thirds to the smoking cessation intervention (SI) and one third to the usual care (UC), which most of the time consisted of brief smoking cessation advice only.

All patients were asked to fill out a set of questionnaires. This set of questionnaires consisted of demographic characteristics and 80 items (Table 1) concerning smoking, including Fagerströms grade of addiction,[5] the intention to change, and attitude, social influence and self-efficacy (ASE-model[6]). Additionally, patients were asked to complete 4 psychological questionnaires, which had shown in previous studies significant differences in scores on depression[7,8] anxiety (ZBV)[7,9] and somatisation 'Amsterdamse Biologische Vragenlijst' - Neurotic[10], between continued smoking and quitting who had a myocardial infarction.[11]

Smoking cessation intervention

Answers to questions of the ASE-model, given by the patients from the intervention

Table 1 *Baseline characteristics of participants in intervention and usual care group.*

	intervention	usual care	total
n =	219	114	333
Demographics			
Male	164 75%	84 74%	248 74%
Mean age (years)	54 {47, 62}	55 {49, 66}	54 {48, 63}
Mean years of education	12 {8, 13}	12 {8, 12}	12 {8, 13}
Smoking history			
Smoked last 24 hours	169 78%	78 69%	247 74%
Smoked last week	203 94%	95 86%	298 91%
Quit last month	31 14%	20 18%	54 16%
# cigarettes	15 {10, 25}	15 {10, 20}	15 {10, 25}
# years	35 {28, 43}	35 {30, 48}	35 {29, 44}
Packyears	34 {19, 60}	28 {18, 54}	30 {18, 56}
Addiction (Fagerstrom) [0;10]	5 {3, 7}	5 {3, 6}	5 {3, 6}*
Attempt to quit			
Last year	98 52%	41 44%	139 50%†
Median number	2 {1, 3}	2 {1, 3}	2 {1, 3}
Total	159 74%	85 77%	244 75%
Median number	3 {2, 6}	3 {2, 4}	3 {2, 5}
Intention to change			
Precontemplation	42 19%	22 20%	64 20%
Contemplation	48 22%	23 21%	71 22%
Preparation	95 44%	47 42%	142 43%
Action	31 14%	20 18%	51 16%
Attitude [-24;51]	17 {8, 25}	15 {6, 25}	17 {8, 25}
Self-efficacy [-78;78]	-5 {-22, -13}	-1 {-15, -16}	-3 {-19, -13}
Social Influence			
Smoking environment[-6;6]	1 {-2, -3}	1 {-1, -3}	2 {-2, -3}
Stimulus [-18;18]	8 {4, 11}	7 {3, 11}	8 {3, 11}
Psychological characteristics			
Depression			
Zigmond [0;21]	6 {3, 8}	6 {2, 9}	6 {2, 8}
Wald [0;32]	2 {0, 8}	3 {0, 8}	3 {0, 8}
Anxiety			
van der Ploeg [20;80]	50 {48, 53}	50 {48, 52}	50 {48, 53}
Zigmond [0;21]	8 {6, 12}	8 {5, 11}	8 {5, 11}
Somatisation, Wilde [11;46]	22 {16, 28}	24 {19, 29}	23 {17, 28}
Department of inclusion			
Outpatient clinic	150 69%	74 65%	224 67%
Cardiology ward	62 28%	36 32%	98 29%
Rehabilitation centre	7 3%	4 4%	11 3%

* *Interquartile range*

† *Only of those who did not quit smoking in the past month.*

group, were entered in a computer database. Then, data were sent to the department of Health Promotion and Education of the University of Maastricht, in order to create a computer generated personalised letter which generated information based on the patient's responses in the questionnaire[12], which formed the first part of the intervention.

A software programme, linked to this database, generated tailored letters: answers on questions concerning smoking behaviour, stage of change, perceived outcomes and situational self-efficacy levels were converted to individual letters, tailored to the individual situation which were personalised by using for example patient's name, the amount of cigarettes and the number of years smoked. In the letter, information was offered on favourable outcomes of smoking cessation such as positive consequences on health and environment. Pros and cons of smoking and smoking cessation were restructured in order to increase motivation. Furthermore, skills and suggestions for coping with difficult moments and situations were presented, again tailored to the personal situation. Patients received this letter at home one week after having completed the set of questionnaires, and before the counselling visit by the nurse along with an invitation to visit one of the three trained nurse counsellors at the outpatient clinic within a fortnight.

In addition, in the Netherlands, a minimal intervention smoking cessation programme was developed by the Department of Psychology of the University of Twente, in collaboration with the Department of Health Education and Promotion of the University of Maastricht. In this individual nurse-offered program, the nurse assists the patient systematically in how to quit smoking by discussing six steps:

1 assessing the smoking profile,
2 assessing the motivation to quit smoking, and
3 assessing the expected barriers;
4 setting a date to stop smoking,
5 offering supporting aid and
6 assisting at follow-up, in order to prevent relapse.

This program had proven to be effective in the general practice.[13]

After assessing the patient's stage of motivation assisted by the nurse, the appropriate next step is decided.[14] Supporting aid was offered by means of two self-help brochures: one addressing the six steps attitude, social influence and self-efficacy information, and one containing information on the risk of smoking for coronary patients.

Follow-up

Follow-up care was offered by means of three consecutive phone calls from the nurse - at two, four and eight weeks after their first visit - and again a visit with the nurse after three months.

The same set of questionnaires was presented again to all patients after one year. Patients who visited the hospital after one year and who had stopped smoking were asked to exhale in a Smokerlyser (Bedfont, Upchurch, England), in order to measure carbonmonoxide levels in the expired air. This method was available, cheap and easy

to use, and therefore preferred to cotinine measurements, and has a fairly good sensitivity (98%) and specificity (81%).[15] Furthermore, data on medical history such as coronary events, revascularisation interventions and comorbidity, were collected from the medical records.

The endpoint was self-reported smoking cessation (for at least the past seven days) one year after inclusion, confirmed by carbonmonoxide measurements, if possible (Figure 1). Secondary endpoints were any attempts to stop smoking, the number of cigarettes smoked daily at one year follow-up, and a change in motivation to stop.

Sample size and data analysis

The percentage of quitters in patients, randomised to the UC group was estimated at 15% - higher than the general smoking population, but lower than a population of recently admitted coronary patients. From previous studies, it was hypothesised that the intervention group would double this to 30% - again, higher than a general smoking population, who received a smoking cessation program, but lower than hospitalised coronary patients.[13,16-18] To offer the program to as many patients as possible and reach a power of at least 80%, by 2-sided testing with a significance of $\alpha = 0.05$, a 2:1 design was chosen with a calculated total sample size of 330.

Analysis of the efficacy of the smoking was performed according to the intention-to-treat principle. Comparisons of differences in baseline and outcome variables between the groups were performed by a Chi-square analysis for nominal variables, a Mann Whitney test for ordinal variables and a T-test for continuous variables. An analysis of variance for repeated measures was used for the mean number of smoked cigarettes and change in motivational state. Univariable and multivariable logistic regression analyses were performed to determine independent predictors of smoking cessation. Variables which were examined included demographics, medical history smoking profile and psychosocial factors. All variables entered the multivariable stage, independent of the results in the univariate analyses. The final multivariable regression model was constructed by backward deletion of the least significant characteristics. The predictive accuracy of the multivariable model was evaluated by the C-index.[19] We evaluated whether the success of the smoking cessation program was related to depression, stage of change, self-efficacy and Fagerström score: i.e. we tested for interaction between these patient characteristics and allocated strategy. Statistical significance for all tests was stated at the 0.05 probability level.

Results

Patient Baseline characteristics

Between February 1997 and May 1998, 333 patients were included, of whom 219 patients were assigned to the smoking intervention group en 114 to the usual care group. In the university hospital, 153 patients (46%) were included, 169 patients were enrolled in the three general hospitals and 11 patients in the cardiac rehabilitation centre. 224 (67%) patients were included through the outpatient clinics and 96 at the wards. Demographics, smoking history and medical are shown in Table 1. The SI-

group and the UC-group were comparable, except for 'smoking last week' and the number of packyears (product of number of years smoked and number of packages (20 cigarettes) smoked daily); both were more favourable for the UC group.

Compliance

Of the 219 patients, who were randomised to the intervention, 186 (85%) attended the first visit at the nurse's outpatient clinic; mean duration of the visit was 33 minutes. The three consecutive phone calls were made successfully to respectively 180 (82%), 169 (77%) and 131 (60%) of the patients; the average of all phone calls was 10 minutes. 133 (61%) patients attended the 3 months visit - 12 by telephone - and 105 (48%) attended the last visit after one year, of whom 29 telephonically; again the mean duration of the visits was 30 minutes.

One year

Effect intervention

After one year, 12 patients had died (5 in the intervention group and 7 in the control group), 3 patients had withdrawn their informed consent (all in the control group) and 21 patients refused to respond (10 in the intervention group and 11 in the control group). Of the 297 (89%) patients whose smoking behaviour was known (105 through the visit and 192 by means of the questionnaire, reminding letter or phone call), 22% of the patients in the intervention group reported to have quit vs. 20% of the control group ($p = 0.95$). Seventy-three percent of the 297 had completed the questionnaire after one year. In those who attended the one year visit, stopped smoking and carbonmonoxide in expired air was measured ($n = 19$), all scores were negative, implying that self-reported smoking cessation was reliable.

Seventy-one percent of the patients in the intervention group had attempted to stop smoking during the last year, while 65% of the control group had ($p = 0.35$). The number of cigarettes smoked was significantly decreased at one year (from 17 to 15 cigarettes daily for both groups, $p = 0.031$), but no difference was found between the intervention and the control group. Motivational stage of change decreased in time; again not different between the two groups.

Predictors of smoking cessation

Table 2 presents baseline characteristics according to smoking status at one-year follow-up. Patients who had quit after one year had more often quit already in the month before the inclusion than continuing smokers ($p < 0.001$). Consequently, one-year quitters were at baseline more often in the action stage, while smokers after one year were at baseline more often still in the preparation phase. One third of the quitters had never attempted to quit before, while in the persistent smokers this percentage was 22% ($p = 0.049$). With regard to self-efficacy, quitters were more convinced to be able to refrain from smoking in difficult situations ($p = 0.017$), than persistent smokers. Continuing smokers had more smokers in their environment (especially the partner: 33% vs. 45%; $p = 0.048$) and received less support from their close relatives and friends than quitters ($p = 0.029$).

Table 2 *Baseline predictors of smoking cessation after one year.*

	quitters	smokers	p*
n=	60	237	
Demographics			
Male (%)	75	77	ns
Mean age (years)	55	56	ns
Mean years of education	12	11	ns
Smoking history			
Smoked last 24 hours (%)	45	83	< 0.001
Smoked last week (%)	75	94	< 0.001
Quit last month (%)	41	9	< 0.001
# cigarettes	15	18	ns
# years	31	36	0.021
Addiction (Fagerström) [0;10]	4	5	ns
Attempt to quit			
None last year (%)	61	56	ns
Mean number	3	3	ns
None ever (%)	34	22	0.049
Mean number	5	5	ns
Intention to change			
Intention [-3;3]	2	2	
Plan [1;7]	2	2	ns
Stage of change			< 0.001†
Precontemplation	8	23	
Contemplation	14	23	
Preparation	37	46	
Action	41	9	
Attitude [-24;51]	12	11	ns
Self-efficacy [-78;78]	7	-3	0.017
Social Influence			
Smoking environment[-6;6]	0.3	0.6	0.024
Support [-18;18]	9	7	0.029
Psychological characteristics			
Depression			
Zigmond [0;21]	4	6	0.001
Wald [0;32]	3	6	0.003

ns = not significant

* *univariate test between smokers and quitters.*

† *$p < 0.05$ in multivariate logistic regression analysis*

Table 2 *Continued*

	quitters	smokers	P*
Psychological characteristics			
Anxiety			
van der Ploeg [20;80]	50	50	ns
Zigmond [0;21]	8	9	ns
Somatisation, Wilde [11;46]	21	24	0.025
Anger, Wald	5	7	0.051
Fatigue, Wald	5	8	< 0.001
Vigour, Wald	11	9	0.083
Tension, Wald	5	7	0.004
Total Mood, Wald	25	36	0.001
Medical history (%)			
department of inclusion			0.002
Outpatient clinic	49	72	
Ward	46	24	
Time since diagnosis (years)	5.1	7.0	0.048
AMI	48	53	ns
Intervention			
PTCA before inclusion	22	25	ns
PTCA after inclusion	2	4	ns
CABG before inclusion	10	18	0.093
CABG after inclusion	10	3	0.024†
COPD	10	18	ns
Other risk factors			
Hypertension	30	27	ns
High cholesterol	68	64	ns
Diabetes	6	8	ns
Family history	38	26	0.051

ns = not significant

* *univariate test between smokers and quitters.*

† *$p < 0.05$ in multivariate logistic regression analysis*

Also, patients who stopped smoking were more often enrolled at the clinical wards (46% vs. 24% of smokers, $p = 0.002$). Patients who had more recently been diagnosed with coronary artery disease, were more likely to stop smoking ($p = 0.048$) than those who had a longer history of coronary artery disease. Other medical predictors were not demonstrated, except for undergoing bypass surgery after inclusion (10% of the quitters vs. 3% of the continued smokers, $p = 0.024$) and a trend was seen for a positive family history of coronary artery disease. Furthermore, patients who continued smoking had a less favourable psychological profile than quitters did. They experienced more often symptoms of depression, feelings of fatigue and tension and had more often total mood disturbances (all $p \leq 0.001$).

In a multivariable logistic regression, the motivational stage of change (OR 1.8, 95% confidence interval 1.0 to 3.3), fatigue (OR 0.8, 95% confidence interval 0.8 to 1.0) and a bypass operation after inclusion (OR 2.8, 95% confidence interval 1.2 to 6.8) were independent predictors of smoking cessation after one year. The C-index for the smoking cessation model was 0.797, reflecting good ability to discriminate between patients who did and did not stop smoking after one year.

Discussion

Smoking cessation intervention

In the current investigation, 22% of the patients in the intervention group reported to have quit vs. 20% of the control group, which means that this program was not effective. In fact, the percentage quitters in the intervention group was lower, and the percentage quitters in the control group higher than expected. It should be appreciated that the assumptions of these percentages were uncertain since they are based on comparable but not identical studies (general practice 15% vs. 5%, [9] inpatients after myocardial infarction 71 vs. 45[16], 57 vs. 48[17] and 70 vs. 53[18] after one year). For this particular group of smokers, the minimal intervention was probably not sufficient. This was confirmed by the evaluation forms: of the patients who attended the outpatient visit after one year and completed an evaluation (87%), more than 80% was overall satisfied with the program. Nevertheless, one fifth recommended more contacts. Especially in the beginning, stoppers need a lot of support to prevent relapse, and the three phone calls in the first two months might not have been sufficient for this group of smokers.

Table 3 *Odds ratios and the 95% confidence intervals of factors in smoking cessation programs.*[2]

	OR	95% CI
start in-hospital	5.4	3.8 - 7.6
additional support (eg. video, tapes, NRT*)	2.7	2.1 - 3.5
admitted for revascularisation	2.6	2.0 - 3.4
study performed in USA	2.0	1.6 - 2.5
group session added to individual	2.0	1.5 - 2.5
diagnosis myocardial infarction	1.3	1.0 - 1.7
program part of rehabilitation	1.2	0.9 - 1.6
family involved	1.1	0.8 - 1.5
unifactorial program	0.9	0.7 - 1.1
follow-up phone calls	0.7	0.6 - 0.9
manuals hand out	0.6	0.4 - 0.9
outpatient follow-up	0.5	0.4 - 0.6
multidisciplinary approach	0.5	0.4 - 0.6
individual support	0.4	0.3 - 0.5

* *Nicotine Replacement Therapy.*

In a recently published review, ten studies on smoking cessation interventions for coronary patients were investigated.[2] Unfortunately, the intervention programs were often not very precisely described, in particular the intensity and duration of the programs were frequently not specified, which makes it impossible to investigate all elements in the program that make it successful. If we calculate univariate odds ratios for all patients (n = 1,076) who received the intervention program in those ten studies, comparing quitting (53% of baseline smokers) and persistent smoking, programs were most effective which started in-hospital, especially after a serious coronary event, and included additional groups sessions and support, such as relaxation tapes and nicotine replacement therapy (Table 3). Unfortunately, none of these components were incorporated in our study, and factors, such as individual support and manual hand-outs, even appeared to be negatively related in the reviewed studies (Table 3), which might partly explain the lack of effect of the program.

The observed percentage quitters in the control group was higher than expected. Therefore, the percentage of quitters after one year in an unselected group of baseline smokers, who did not participate in the current study, in an outpatient population, was investigated. Eight (10%) of the 78 patients (of the 87 non-participants; 90% response) had stopped smoking after one year, which was similar to other investigations, and less than those who participated in the study ($p = 0.042$). This means that motivation to participate in a smoking cessation intervention and answering an extensive set of questionnaires instigates one fifth of the patients to stop smoking.

Nicotine replacement therapy was not prescribed in this program. At the start of this study, the side effects of nicotine replacement therapy in heart patients were feared, especially if the patient continued to smoke, and cardiologists were reluctant to initiate such therapy. Recent studies, however, have shown that nicotine replacement therapy can be safely used by coronary patients.[20] Nicotine replacement therapy in addition to a smoking cessation program doubled the percentage smokers,[21] so in future, nicotine replacement should be integrated in the current smoking cessation program.

Predictors

In previous studies, there is no consensus whether previous endeavours to stop smoking are predictive of a successful attempt,[22] or whether the first attempt is most likely to succeed.[23] One third of the quitters in this study had never attempted to quit before. Patients who continued smoker had more often made previous attempts to quit. The failure of previous attempts might have discouraged them to comply with the current program, so it would be advisable to discuss the reason of previous failures, before a new attempt is initiated.

Patients who continued smoking had a less favourable psychological profile. In other studies, higher scores of depression and anxiety were predictive for continued smoking.[11,24,25] Unless these problems are improved, it is not very likely these patients will stop smoking in the near future. Bupropion, originally an antidepressant, has

recently proven to be effective in smoking cessation.[16] This might be a useful treatment for patients with a less favourable psychological profile, but further research is necessary in this field.

Continuing smokers had more smokers in their environment and received less support from their significant others than quitters. Social support has already been proven to be important for smoking cessation in previous studies. Simply being married,[27] but also having lower levels of negative support and higher positive social support,[28] were related with quitting.

Conclusion

The current minimal smoking cessation intervention, implemented in an outpatient setting, was not effective. The study was designed to use available interventions, which were already applied in the general population or general practices, in a new setting. Because of the modest budget, a simple and easy to perform scheme was used, adjusted to the current outpatient practice. In the future, smoking cessation programs which are executed at the outpatients clinic but are initiated during hospitalisation, especially after a myocardial infarction or a revascularisation intervention, which include groups sessions, and which offer additional means of assistance, are most likely to be effective. Furthermore, a more intensive and frequent follow-up should be offered in order to keep patients motivated and prevent relapse.

Individual circumstances should be taken into account. For example, investigating and discussing the reason for failure of previous attempt might improve the chance of success for a next attempt. Also, smokers might be offered a psychological questionnaire, in order to value to what extent psychological problems might restrain them from quitting. Psychological counselling or psychopharmaca might be useful to provide better circumstances to quit, in those who have symptoms of depression or anxiety. Bupropion, originally an antidepressant, has recently shown to be effective in smoking cessation [15] and might be a remedy for this particular group of smokers. Also, when advice to stop smoking is offered, it is advisable to involve the closest family members. They should be encouraged to stop smoking themselves, if applicable, and to support the patient.

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Discussion

Chapter 8

Introduction

Exhaustive research has shown that smoking causes cardiovascular disease.[1,2] Cardiovascular disease is the number one cause of mortality and smoking is the most important changeable risk factor for cardiovascular disease (Chapter 1).

The aim of this thesis was to investigate the effect of smoking cessation on the prognosis of coronary artery disease. Furthermore, to make an inventory of steps currently taken to make patients stop smoking, and to analyse how effective they are. Also, a new smoking cessation program was offered to coronary outpatients, with the purpose to investigate whether this program was effective in this setting and whether predictors could be indicated for smoking cessation. These predictors were also explored in patients who had had a myocardial infarction. In this discussion, important findings of these investigations are reflected upon and suggestions for future smoking cessation programs and research are made.

Smoking cessation in coronary patients

Smoking cessation decreases the chance of new events in patients with coronary artery disease. Patients who stop smoking after a coronary event have a 35% lower risk of a (re) infarction or early mortality (Chapter 2). In one particular coronary group, namely those who underwent coronary bypass graft surgery, long-term smoking cessation led to 14% benefit of survival after 15 years and to a decreased risk of repeated revascularisation procedures (Chapter 3). As shown in other studies, smoking at baseline was not related with long-term survival.[3] This finding can be mainly explained by other differences between baseline smokers and non-smokers as discussed in the next section.

The effect of smoking cessation on other cardiovascular risk factors is not clear. An increase in HDL-cholesterol has been demonstrated[4,5] but also worsening of hypertension, possibly caused by the increase in weight.[5] However, other studies did not show an independent effect of smoking cessation on hypertension or total cholesterol.[6] A positive effect of smoking cessation can also be expected in other atherosclerotic symptoms, such as intermittent claudication[7] and stroke, although the latter has not been clearly established.

Favourable effects of smoking cessation as secondary prevention have been demonstrated, besides its benefit for patients with cardiovascular disease. For example, smokers with impaired pulmonary function, especially due to chronic obstructive pulmonary disease, who stopped smoking, had significantly slower rates of FEV1 decline with age than those who continued.[8,9] Within a few years after quitting, rates of decline diminished to a level similar to that of people who had never smoked.[10] Although smoking cessation does not significantly improve the short-term prognosis of lung cancer,[11] probably because of the irreversible mutations caused by smoking[12], it does improve the quality of life, since continued smoking is related with more pulmonary complications[13] and weight loss.[14] Also patients with other neoplastic diseases, such as oral cancer,[15,16] carcinoma of the bladder,[17] prostate cancer,[18] and cervical lesions[19] have a better prognosis after smoking cessation. Finally, smoking cessation has a positive effect on the female reproduction system in cases of

miscarriage or infertility,[20] and quitting during pregnancy results in a decreased risk of low birth-weight, increased gestational age[21] and lower perinatal morbidity rate[22] compared to continued smoking.

Cost-effectiveness

In spite of these promising figures, little attention is paid to smoking cessation interventions in health care. The expenses of Health Care in the Netherlands increase enormously. In view of this, it is to be expected that there is an increasing interest in secondary prevention. The total annual amount of money, which is spent on smoking cessation in the Netherlands, is estimated at 22 million guilders (Table 1). Of the smokers who attempted to stop in 1998, approximately 138,000 smokers (16%) used nicotine replacement therapy,[23] which corresponds with roughly 12 million guilders. (Personal communication: D. Vierling, IMS Health Self-medication - Pharmatrend) - Nicotine replacement therapy can not be reimbursed in the Netherlands. - Furthermore, in 1998, 952 smokers attended a smoking cessation program offered by community health services. (Personal communication, M. Willemsen, Dutch Foundation on Smoking and Health) Moreover, about 1,500 smokers participated in the Allan Carr intervention, total costs 600,000 guilders (Personal communication, E. de Mooy, Co-ordination Allen Carr, the Netherlands) The total amount spent on the prevention of smoking, including the budget of the Dutch Foundation on Smoking and Health, 22 million guilders, is probably largely exceeded by the marketing budget of the tobacco industries, an amount that is not made public by the companies involved. Every year, about 5.3 billion guilders are spent on tobacco products, of which 3.3 billion is excise duty. The government spends an estimated 6.5 billion guilders on diseases related to smoking.

Also, smoking and accompanying illnesses induce incapacity for work, which brings about costs for employer and government. That is why controlling tobacco use at the workplace and protection of the non-smokers from the adverse effects of second-hand smoke have been widely applied in the U.S.A.[24]

Since non-smokers are healthier than smokers, it seems logical to assume that smoking cessation will save money on health care. However, non-smokers become on average 8 years older than smokers,[2] and thus require more health costs related to older age. In a comparison of total health care costs between smokers respectively non-smokers and a general mixed population, costs for non-smokers were 7% (men) and 4% (women) higher, whereas for smokers the total costs are 7% respectively 11% lower than for the general population.[25] Fifteen years after smoking cessation, health costs - increased due to older age - exceed costs of prevention of smoking-related diseases. However, in medical decision analysis, costs are compared with the benefits. Benefits of smoking cessation are not only a better prognosis, as regards mortality and morbidity, as discussed in chapter 2, but also an improvement in the quality of life, as shown by poorer health ratings, respiratory problems, impairment in mobility and higher stress levels, especially in the elderly, although the direction of this relationship is still unclear.[26] At the moment, a special smoking cessation quality-of-life questionnaire is being developed, designed to quantify the impact of smoking cessation on perceived functioning and well-being in adults.[27]

Table 1 *Amounts spent on smoking/smoking cessation (in guilders (f))*

Smoking	amount
Tobacco industries	f 2,000,000,000
Smoking cessation	
Dutch Foundation on Smoking and Health	f 9,000,000
promotion and education	
Interventions	
Community services	f 200,000
Allan Carr	
Book	f 1,000,000
Session	f 600,000
NRT[1]	
Patches	f 5,384,300
gums	f 6,056,700
Total	f 22,241,000

1 *Nicotine Replacement Therapy*

Table 2 *Cost-effectiveness of smoking cessation interventions.*

Intervention	Costs per life-year saved (in dollars)
General practitioner	
Advice only	$ 1,500[27]
Counselling	$ 1,000-2,000[28]
Nurse assisted	$ 160-220[29]
NRT *	$ 7,000[30]

* *Nicotine Replacement Therapy*

Smoking cessation interventions are extremely cost-effective. Depending on the success rate, the intensity of the intervention and the population, costs per life-year saved vary from $200 to $10,000. Compared to a coronary bypass operation (ranging from $4,000 to $30,000)[31] or lipid-lowering treatment (approximately $25,000),[32] smoking cessation programs are very worthwhile. Moreover, the more intensive the intervention, the lower the cost per QALY saved, which suggests that greater spending on interventions yields more net benefit.[31] However, the comparison of different smoking cessation intervention modalities is more complicated since smokers who select an intervention themselves differ between the different modalities. Smokers

who are 'easier quitters' choose more often self-help treatments, which might be most effective for them. Randomisation will decrease baseline differences, but the advantage of selecting the individual's most effective intervention is missed.[35] However, as the provision of brief smoking cessation advice to hospitalised smokers is relatively inexpensive and cost-effective, it should become part of standard in-patient care.

Smoker's Paradox

Some large trials in post-myocardial infarction patients have demonstrated a better prognosis in baseline smokers, which is called the "smoker's paradox". In an extensive study of thrombolysis (GUSTO-I), non-smokers experienced more often an in-hospital reinfarction, shock, stroke, bleeding or mortality than active smokers.[36] This paradox can be explained by the fact that the smokers were on average 11 years younger than non-smokers do, and had less comorbidity or severe coronary artery disease than non-smokers can.[37,38] In our investigation of smoking cessation after a myocardial infarction, these findings were confirmed (Chapter 5). Nevertheless, smokers had a slightly decreased risk ratio for cardiovascular events, even after adjustment for these differences. It has been suggested that smokers have an enhanced systemic fibrinolysis following thrombolysis, which protects against further thrombotic adverse events.[39] Measured fibrinogen concentrations after thrombolysis support this, but further research in larger populations is needed.

Smoking cessation interventions

The favourable results of smoking cessation as secondary prevention justify comprehensive time and effort to develop interventions for patients who continue to smoke. Smoking cessation programs for patients with coronary artery disease have proven to be effective. In studies of smoking cessation programs for coronary patients, patients who received a smoking cessation program quitted 20% more often, compared to those who received the usual care (Chapter 2). However, the minimal intervention smoking cessation program for coronary outpatients, which was described in Chapter 6 and 7, was not effective. Smoking cessation interventions in other outpatient settings showed various effects. An intervention with a self-help manual and/or a single counselling by a nurse resulted in a higher number of attempts in the intervention group, but not in more quitters after one month or six months.[40] A more intensive smoking cessation intervention (12 contacts and nicotine replacement therapy) for early COPD patients, resulted in significantly more quitters after one year,[41] while an extensive behaviour therapy intervention for diabetics was not more successful than physician's advice only.[42] There is no consensus, which program must be offered, but those programs were most effective which started in-hospital, especially after a serious coronary event, and included additional group sessions and support, such as relaxation tapes and nicotine replacement therapy (Chapter 7).

Smoking cessation interventions have been offered in different settings (Table 3). Public health smoking cessation interventions, such as the Community Intervention Trial for Smoking Cessation (COMMIT)[43] and the Quit and Win contest,[44] had modest

but statistically significant impact. In the U.S.A., various interventions to a decrease in prevalence of tobacco use[49] and an increase in tobacco-free schools. Peer-pressure and access to cigarettes at home were important predictors.[50] Since addiction is a persistent and difficult issue, high priority should be given to developing a program to prevent people from starting to smoke. The smoking cessation intervention, which was described in Chapters 6 and 7, had proven to be effective in a general practice setting.[51] Pregnant women, who were referred to a smoking cessation program, did not respond, while the participation of the women assigned to the immediate intervention was 93%; they had from two to three times higher rates of cessation.[56] In a smoking cessation program for post-discharge diabetic patients, smoking status was only routinely recorded in those patients with a cardiac condition. Ninety-one percent of the patients refused to participate in the program, which was attributed to the severity and chronicity of the physical condition.[57] Nursing interventions have shown to be effective (Odds Ratio 1.4, 95% confidence interval 1.2 to 1.7), with some evidence that interventions were more effective for cardiovascular hospital in-patients.[58]

Table 3 Smoking cessation interventions in different settings.

Intervention	Effect
public health	
international	small, but significant effect[41-43]
Dutch	no significant effect[43]
worksite	effective if more intensive[44-46]
school (U.S.A.)	favourable effects[47,48]
general practice	small, but significant effect[49]
hospital	effective if intensive and in high-risk groups, such as COPD[59] coronary disease[60] or pregnancy[57,59]

From the above mentioned interventions, it can be concluded that smoking cessation programs can be successful, especially if they are extensive or applied in high-risk groups of motivated patients.

After multivariate adjustment, a higher number of intervention sessions and modalities, and the combination of individual and groups meetings were associated with intervention success.[58] The impact of a coronary event, such as a myocardial infarction or revascularisation procedure, and the urgency to change this hazardous behaviour, should be exploited to enhance the success of an attempt to quit. Patients who continue smoking, despite these warnings, need more intensive or additional support in order to quit as will be discussed below.

Psychosocial factors

In a large epidemiological survey on cardiovascular disease (Framingham), recent

hospitalisation and development of coronary heart disease were predictive for smoking cessation.[59]

Nevertheless, about half the patients who are admitted for a coronary event are smoking one year after the hospitalisation.[60] In order to address smoking cessation programs to those who are least likely to stop smoking, predictors of persistence in this unhealthy behaviour are required. The psychological profile and the social environment play an important role among coronary patients who smoke.[61] In this thesis, apart from seriousness of illness, smoking history and motivation to stop, social isolation and symptoms of depression were predictive for continued smoking in patients who had had a myocardial infarction. Retrospectively, persistent smokers had more smokers in their environment, experienced less social support to quit and had more often an unfavourable psychological profile (Chapter 5). Coronary outpatients, who participated in a smoking cessation intervention, confirmed these findings (Chapter 7). This means that coronary patients, who continue smoking, might have unfavourable psychosocial circumstances, which restrains them from quitting. Psychological counselling or social work support might here be more appropriate than a general smoking cessation intervention.

Previous studies have shown that a history of depression is associated with continued smoking[62] and additional support in order to prevent dysphoric symptoms has been suggested.[63] The antidepressant bupropion, proven to be effective for smoking cessation,[64] showed equal positive effects in smokers with and without a history of depression.

In this study, no association was demonstrated between baseline depression score and smoking cessation after one year.[65] Other antidepressants showed inconclusive effect on smoking cessation; anxiolytics have no beneficial effects for quitting.[66] Future smoking cessation programs for coronary patients might be supplemented with an antidepressant, but this should first be investigated.

In recent years, there is a growing interest for passive smoking and its effect on health. A meta-analysis of epidemiological studies on passive smoking and the risk of coronary artery disease showed an increased relative risk (RR 1.23, 95% confidence interval 1.17 to 1.32) for non-smokers who were exposed to environmental smoking.[67] Although this topic goes beyond the scope of this thesis, environmental smoking may be taken into account when discussing prevention and risk of coronary artery disease.

Role of physicians / hospital

Current management of smoking in patients with coronary artery disease is still insufficient. Following the European guidelines concerning prevention of coronary risk factors,[68] a European survey of registration and management of secondary prevention by cardiologists was performed; EUROASPIRE.[69] This survey showed that in 18% of the smokers, no entry about smoking could be found in the medical record. Although 92% of the current smokers had received advice to stop smoking, this was only recorded in 57% of the patients. Follow-up registration of smoking status was

present in only 35% of all pre-event smokers and only 9% were referred to additional therapy (Chapter 4). In 1998, an update of the guidelines was published, mainly because of new insights in lipid treatment.[70] The European Survey on risk factor management was repeated once more. Preliminary results in the Netherlands show that management of smoking has not changed markedly. (Personal communication, Euroaspire II Working Group)

Various reasons for under-management of smoking by physicians could be:

1 not trained to give health education / change behaviour

2 no tools (medication) to offer

3 unsatisfactory, because of frequent failure

4 not responsible for unhealthy behaviour patients / violation of privacy

5 own smoking behaviour (?)

In the past, smoking rates among physicians exceeded those of the general population, but in 1989, 30% of physicians (in training) were smoked which was below the average of the total population (33%).[71] General practitioners smoked more (men 41%, women 24%), but medical students (19% and 16%, respectively) less than the general population (37% respectively 29%), reflecting the decline in smoking rates over the last decades. In the Netherlands, the Medical Alliance against Smoking aims to make health workers more aware of the risk of smoking and stresses their responsibility.

Perhaps physicians are not the proper health workers to give a smoking cessation intervention,[72] but their authority over patients plays a crucial role in advice to stop smoking. Physicians should take time to advise all their patients who smoke to quit. Smokers, who are committed to quit, should be given additional support and offered nicotine replacement therapy, if necessary.[28] Training residents in giving advice to quit, resulted in en increase of questions raised about smoking habits (77 vs. 68%), advice to quit (43 vs. 28%), providing counselling for cessation (25 vs. 10%), giving self-help materials (7 vs. 1%), and arranging follow-up visits (5 vs. 1%) compared to the period before this training. Also, the self-perception of confidence (5.4 vs. 4.6 (max. 10)) and effectiveness (5.3 vs. 4.0) in counselling of the residents increased after the training.[73]

In a primary care setting, chart reminders increased documentation of smoking status from 33% to 83% and the proportion of all patients counselled increased from 6% to 13%.[74] A simple sign in the medical status might trigger the physician in the next visit

to discuss smoking again. Also, the use of biological markers of tobacco exposure, such as carbon monoxide levels in expired air, can be used as a tool for personal feedback. It is simple to measure, relatively cheap and has in several studies shown an enhanced effect of smoking cessation advice.[75] Finally, in communications with other health workers, especially the general practitioner, smoking status should always be mentioned, so that reinforcement and follow-up can be offered, even after discharge.

Smoking cessation program embedded in prevention clinics

The authors of the WHO MONICA study, examined the reason for the decline in coronary heart disease mortality: two thirds of the decline were due to a decrease in incidence and one third because of a decline in mortality.[76] The decrease in incidence can be explained by positive changes in the risk profile. In contrast to primary prevention, even modest treatment effects from secondary prevention can benefit large numbers of patients. Patients with clinical evidence of cardiovascular disease are likely to be more motivated than their healthy counterparts to make and maintain lifestyle changes.[77] In a review of multiple risk factor interventions for primary prevention of coronary heart disease, a decrease of 4% (95% confidence interval 4 to 5) smokers was found.[78]

In various countries in Europe, secondary prevention programs are initiated in order to further improve the risk profile of high-risk patients. A comprehensive community based program to control cardiovascular diseases was started in North Karelia, Finland, in 1972, because of exceptionally high cardiovascular mortality rates. The effect of the program (net reduction in North Karelia) after 10 years was estimated 28% reduction in smoking among the middle aged male population and 14% among the female population.[79] The changes in risk factors have extended to entire Finland, which, as regards smoking, has led to the lowest prevalence in Europe (see Chapter 1).

Another example, the Bromley Preventive Cardiology Program in England, is a secondary outpatient clinic for patients who were admitted and for the first time diagnosed as having coronary artery disease. A specialised nurse paid a short visit to the patient in the hospital, and subsequently at home within 72 hours after discharge. Next, the patient was screened for risk factors in the outpatient clinic and started on a health promotion program, consisting of exercise sessions and 8 workshops, on coronary risk factors, family risk factors, smoking, diet, physical activity, stress management, medication and support groups, which were given by various disciplines (e.g. dietician, physiotherapist, pharmacist). In this program, merely 12% were smoking at the start of the program, which decreased to 8% after 3 months.[80]

Future smoking cessation intervention

In view of previously described results and literature study, a future outpatient smoking cessation program should at least include the following elements. A profile should be made of each individual smoker, in which at least three parameters should be measured: motivation, physical (or nicotine) addiction and psychosocial circumstances. It is important to know in which stage of change a patient is,[81,82] in order to decide the next appropriate step. If a patient is not motivated, the pros and

cons of smoking and quitting should be discussed, before strategies for smoking cessation are suggested. In cases where nicotine addiction plays an important role, nicotine replacement therapy might be used. The odds ratio for abstinence with nicotine replacement therapy is 1.7 (95% confidence interval 1.6 to 1.8). Eight weeks of patch therapy, wearing them during waking hours, are as effective as longer use.[83,84] Except for some rare case-reports in which patients continued smoking in addition to the nicotine patches, there is clear evidence that nicotine replacement therapy can be used safely by coronary patients.[85] Finally, the social environment and psychological profile can predict whether a patient is likely to quit.[58] If patients have many smokers among their family and friends, or receive little support, it is advisable to involve other significant people in their circle. Also, if patients suffer from depressive or other psychological problems, professional counselling or psycho-pharmaca could be prescribed, in order to lay a better basis for quitting.

The minimal smoking cessation intervention, which was described in this thesis, was not effective (Chapter 7). A meta-analysis of smoking cessation interventions for coronary patients (Chapter 2 and 7) showed the importance of starting the intervention during hospitalisation. Strong advice to quit[51] and additional information by means of brochures or tailored letters[28] are in themselves already effective. Patients, who do not manage to quit or relapse after discharge, might be offered a more extensive smoking cessation program at the outpatient clinic. This means that follow-up care should be extensive, especially in the first months, and continued for at least one year. Visits (individual or group sessions) and telephonically follow-up can be combined to be effective as well as convenient for both the smoker and the trainer. Although the authority of the treating doctor is required to stress the importance of smoking cessation, the actual intervention might best be offered by a nurse, social worker or health educator. About the frequency and timing of the sessions is still no consensus. Especially in the first months, weekly contacts or phone-calls are required, followed by 1-monthly and once every few months for a year.

Recently, various guidelines have been published for health workers on smoking cessation[86,87] and also in the Netherlands, guidelines for the cardiology department are developed. In future, it would be desirable for each country to have its own guidelines, adapted to the local needs and possibilities. Implementation of the guidelines is the next important goal. Prevention clinics for atherosclerotic symptoms should include a smoking cessation program. The implementation should be multidisciplinary, involving nurses, doctors but also dieticians and physiotherapists, in order to reach as many patients as possible as well as reinforcing the message.

Effective in smoking cessation interventions for coronary patients:

→ Start intervention immediately after event (during admission)

→ Intensive therapy more cost-effective

→ Make smoking "profile" for tailored intervention; motivation, grade of addiction, social circumstances

→ Consider additional drug therapy: nicotine replacement, bupropion

→ Assess psychological profile (additional treatment for e.g. depression)

→ Create supportive smoking environment (family, workplace)

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Summary

In Chapter 1, the relationship between smoking and coronary artery disease as well as the importance of smoking cessation is introduced. Exhaustive research has shown that cigarette smoking is one of the major known risk factors for coronary artery disease. The overwhelming evidence that smoking causes not only cardiovascular disease but also new events in patients who already are diagnosed with coronary artery disease, justifies firm promotion of smoking cessation. The average smoking rate in the Netherlands has stabilised in the last decades around 34%. More attention and financial support, especially for teenagers and patients who already experienced the consequences of smoking, for example a myocardial infarction, is necessary to further reduce this percentage.

In Chapter 2, a review of nineteen observational studies on the effect of smoking cessation in patients with coronary heart disease showed a decline in mortality or non-fatal myocardial infarction of on average 35%. Mortality after a coronary event was 38% lower in quitters compared to persistent smokers, while the incidence of death or myocardial infarction decreased with almost 50%. Furthermore, in nine publications studying trials on smoking cessation programmes in coronary patients, 20% more patients quit smoking after being subjected to a special smoking cessation programme than those who received the usual care. This systematic review of studies observing the impact of smoking cessation on the prognosis of coronary heart disease patients confirmed that this lifestyle change is one of the most powerful tools in reducing mortality and recurrent coronary events. Special smoking cessation programmes improve the success in attempts to quit.

Chapter 3 describes a 20-years follow-up study which was performed in 985 patients who underwent coronary bypass surgery in the 70's, in order to investigate the influence of smoking cessation on mortality. Analysis adjustmented for baseline characteristics showed that persistent smokers had a 68% greater risk of death form all causes and 75% of cardiac death than patients who had stopped smoking for at least one year after surgery. The estimated benefit of survival for the quitters increased from three percent at five years to 14% at 15 years. The smokers were 41% more likely to undergo repeated bypass surgery or percutaneous coronary angioplasty procedures. Smoking cessation after coronary bypass surgery improves prognosis and decreases the risk of repeated revascularisation procedures.

EUROASPIRE is a survey to establish to what extent risk factors are managed and recorded in coronary patients' medical records in 21 hospitals in Europe. Chapter 4 described data on smoking status which were collected from medical records of 4863 consecutive patients who were previously admitted for an acute coronary event. In almost 20% of the patients, smoking habits were not documented in their medical record, while in only 35% of the smoking patients, smoking status was documented again at the follow-up. Thirty-four percent of the patients were smokers, of whom over 90% had received advice to quit smoking. As many as 50% of the patients continued smoking after the event. Advice to stop smoking motivated patients to seek help and to attempt to stop smoking. Thus, there is further potential to reduce the risk of recurrent coronary disease.

In Chapter 5, baseline characteristics of patients who were admitted for a myocardial infarction were related to smoking status at short-term and long-term follow-up. Predictors of quitting or continued could help in deciding to whom additional support should be offered. Demographics, medical history, presence of other coronary risk factors, psychological determinants and the clinical course were recorded in 1472 unselected, consecutive patients who had been hospitalised for a myocardial infarction. At 3 months, persistent smokers were younger than quitters, had been admitted for a shorter period, underwent less often revascularisation procedures, smoked more cigarettes per day at baseline and were more socially isolated. After 4 years, patients who stopped smoking had a larger myocardial infarction and a lower displeasure-score at baseline than those who continued smoking. Also, quitters received more support from their environment. Patients who do not stop smoking after a myocardial infarction should be offered special support. Psychological state and social support are two important factors for smoking cessation, and should be taken into account when offering support to quit.

Although advice and support of smoking cessation is considered as a task of the cardiologist, it still has low priority. Chapter 6 describes the enrolment, baseline characteristics and problems with implementation of a minimal invasive smoking cessation intervention for coronary patients in the outpatient clinic. The smoking cessation intervention consisted of a computer generated letter which was tailored to the patient's situation, and a nurse offered smoking cessation program consisting of a visit at baseline, after 3 months and 1 year and three phone calls. Of the intervention group, 85% attended the first visit (non-attendees had more often already quit smoking in the month before inclusion).

Chapter 7 discusses the effects of the smoking cessation program which was described in chapter 6. Of the patients in the intervention group, 22% reported to have quit vs. 20% of the control group. One third of the quitters had never attempted to quit before. Patients who had quit, had more often quit already in the month before the inclusion, were more often recently admitted and diagnosed with coronary artery disease, and were more convinced to be able to refrain from smoking in difficult situations. Persistent smokers had more smokers in their environment and received less support from their close relatives and friends than quitters. Furthermore, patients who continued smoking had a less favourable psychological profile than quitters. Results suggest a that a minimal invasive smoking cessation program for outpatients with coronary artery disease is not sufficient. Coronary patients who smoke should be encouraged to stop smoking and offered an extensive smoking cessation programme, taking psychosocial factors into account.

In the final chapter, results of the previous chapters are contemplated and also other subjects which are involved in smoking cessation are raised. Benefits are discussed of smoking cessation in other health areas such as pulmonary problems, oncology and infertility. Furthermore, the issue of costs is discussed, for example, the relatively low budget, which is spent on information and support, but also the high cost-effectivity

of smoking cessation interventions. Smoking cessation programs can be successful, especially if they are extensive or applied in high-risk groups of motivated patients. A higher number of intervention sessions and modalities, and the combination of individual and group meetings are associated with a higher success rate. Persistent smokers might profit more from psychological counselling or social work support than a general smoking cessation intervention. Consequent enquiries for smoking behaviour, proper registration and offering additional support, such as behavioural interventions and nicotine replacement therapy, should be implemented in every health clinic. Recently published guidelines offer useful tools to set up support in reducing tobacco use in daily practice.

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Samenvatting

In Hoofdstuk 1 wordt de relatie tussen roken en coronarialijden geïntroduceerd en tevens het belang van stoppen met roken. Uitgebreid onderzoek heeft aangetoond dat het roken van sigaretten een van de belangrijkste risicofactoren is voor coronarialijden. Hierbij is niet alleen aangetoond dat roken kan lijden tot hart- en vaatziekten, maar ook dat roken kan lijden tot nieuwe complicaties bij patiënten die al vaatlijden hebben. Dit tezamen rechtvaardigt een actieve houding ten opzichte van stoppen. Sinds de tachtiger jaren is het percentage rokers in Nederland stabiel op ongeveer 34%. Er is meer aandacht en financiële ondersteuning nodig om dit percentage verder naar beneden te krijgen, met name gericht op het voorkomen van starten met roken door jongeren en op patiënten die al de nadelige gevolgen van roken hebben ervaren, bijvoorbeeld door een myocard infarct.

In Hoofdstuk 2, waarin een overzicht wordt gegeven van negentien observationele studies naar het effect van stoppen met roken bij patiënten met coronarialijden, werd een gemiddelde afname van 35% aangetoond in mortaliteit of een niet-fataal myocard infarct. De mortaliteit bij coronarialijden was 38% lager bij stoppers vergeleken met patiënten die bleven roken, en de incidentie van overlijden of myocard infarct was zelfs bijna 50% lager. Daarnaast werd in negen studies naar het effect van stoppen met roken programma's voor coronairpatiënten 20% meer stoppers gevonden onder patiënten die een programma aangeboden hadden gekregen dan bij hen die slechts de gewone zorg kregen. Dit overzicht bevestigt het belang van het stoppen met roken en het effect op de prognose bij coronairpatiënten. Speciale programma's die steun bieden bij het stoppen leiden tot meer succesvolle stoppogingen.

Hoofdstuk 3 beschrijft een 20-jaars follow-up van 985 patiënten die een bypass operatie hadden ondergaan in de zeventiger jaren, waarbij het effect van stoppen met roken werd onderzocht op de mortaliteit. Bij een voor baseline gecontroleerde analyse bleken de rokers een 68% groter risico op totale sterfte te hebben en 75% op cardiale sterfte dan patiënten die tenminste een jaar na de operatie waren gestopt met roken. De geschatte winst op overleving groeide voor de stoppers van 3% na 5 jaar tot 14% bij 15 jaar. De rokers hadden 41% meer kans op een nieuwe bypass operatie of een angioplastiek ("Dotter-procedure").

EUROASPIRE is een observationele studie naar risico factoren en hun behandeling bij coronair patiënten in 21 ziekenhuizen in Europa. In Hoofdstuk 4 werden de rookgegevens uit medische statussen van 4863 patiënten, die waren opgenomen geweest vanwege coronarialijden, beschreven. In bijna 20% van de patiënten was het rookgedrag niet ingevuld in de status. Daarnaast was bij slechts 35% opnieuw de rookstatus genoteerd bij of controle na ontslag. Vierendertig procent van de patiënten rookten bij opname; 90% hiervan had een stoppen-met-roken advies gekregen. Zeker 50% van de rokers bleef roken na de opname. Het advies om te stoppen motiveerde patiënten om hulp te zoeken en een stoppoging te doen. Kortom, het risico op nieuwe complicaties bij coronairpatiënten kan belangrijk verminderd worden, indien meer aandacht en tijd besteed wordt aan het roken.

In Hoofdstuk 5 werden verschillende baseline eigenschappen vergeleken bij patiënten na opname voor een myocard infarct met de rookstatus na korte en lange termijn follow-up. Zo kon worden voorspeld wie wel of niet zou stoppen met roken op eigen kracht en aan wie dus extra hulp zou moeten worden geboden. Demografische kenmerken, medische voorgeschiedenis, aanwezigheid van coronaire risico factoren, psychologische eigenschappen en het verloop van de opname werden vastgelegd in 1472 patiënten die waren opgenomen vanwege een myocard infarct. Na 3 maanden bleken de nog rokende patiënten jonger te zijn, korter te zijn opgenomen geweest in het ziekenhuis, minder vaak een interventie te hebben ondergaan, meer sigaretten te roken per dag bij aanvang van de studie en sociaal meer geïsoleerd te zijn dan de patiënten die waren gestopt met roken. Na 4 jaar werden patiënten die waren gestopt met roken gekenmerkt door een groter infarct en een lagere score op de ongenoegenschaal. Tevens hadden zij meer steun gehad van hun omgeving. Patiënten die niet stoppen met roken na een myocard infarct moet extra ondersteuning worden gegeven. De psychologische kenmerken en de sociale omgeving zijn twee belangrijke factoren voor stoppen, waar bij het aanbieden van een stoppen met roken programma rekening mee moet worden gehouden.

Hoewel het geven van een stop-advies plus ondersteuning bij een stoppoging een taak van de cardioloog is, heeft het nog steeds een lage prioriteit. Hoofdstuk 6 beschrijft de inclusie, baseline kenmerken en problemen bij implementatie van een minimale interventie studie voor stoppen met roken programma voor coronairpatiënten in de polikliniek. Dit stoppen met roken programma bestond uit een door de computer gegenereerde advies-op-maat brief, aangepast aan de situatie van de patiënt, en een door een verpleegkundige geleid programma dat bestond uit 3 bezoeken (bij baseline, na 3 maanden en een 1 jaar) en drie telefoongesprekken.

Hoofdstuk 7 bespreekt het effect van dit stoppen met roken programma. Van de patiënten in de interventie groep was 22% gestopt tegenover 20% in de controle groep. Een derde van de stoppers had nooit eerder een stoppoging gedaan. Patiënten die waren gestopt, waren vaker al gestopt in de maand voor inclusie, waren vaker recent opgenomen geweest in een ziekenhuis en hadden korter geleden te horen gekregen dat ze coronarialijden hadden. Bovendien waren ze meer zelfverzekerd te kunnen stoppen bij moeilijke situaties. Rokers hadden meer rokers in hun omgeving en ontvingen minder steun van hun familie en vrienden dan stoppers. Bovendien hadden patiënten die nog rookten een minder gunstig psychologisch profiel. Deze resultaten suggereren dat een minimale stoppen met roken programma voor poliklinische patiënten met coronarialijden niet effectief is. Coronairpatiënten die roken moeten een uitgebreider stoppen met roken programma aangeboden worden, waarbij psychosociale factoren in ogenschouw worden meegenomen.

In het laatste hoofdstuk worden tevens andere gunstige effecten van stoppen met roken behandeld zoals bij longproblemen, kanker en onvruchtbaarheid. Bovendien wordt het kostenaspect beschouwd; het relatieve lage bedrag wat aan voorlichting en ondersteuning wordt gegeven, maar ook de hoge kosten-effectiviteit van stoppen met roken programma's. Deze kunnen zeer effectief zijn, met name indien ze intensief

zijn en toegepast worden bij hoge-risico groepen met een hoge motivatie. Een groot aantal sessies en verschillende modaliteiten, en gecombineerde individuele en groepssessies zijn gecorreleerd met een grotere kans op succes. Patiënten die blijven roken hebben mogelijk meer aan psychologische hulp of sociaal werk dan een algemene stoppen met roken interventie. Consequent vragen naar rookgedrag, goede registratie en aanbieden van hulp, waaronder gedragstherapie en nicotine-substitutie therapie horen thuis in elke medische kliniek. Recent gepubliceerde richtlijnen vormen een leidraad voor het opzetten van ondersteuning bij het terugdringen van tabaksgebruik in de dagelijkse praktijk.

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Curriculum Vitae

Dorien van Berkel was born on January 7, 1969 in Gouda, the Netherlands. After finishing grammar school - Coornhert Gymnasium - in 1989, she started her medical training at the Erasmus University Rotterdam. During her studies, she worked as a student nurse at the department of thorax surgery at the university hospital Rotterdam. She conducted a study which compared quality of life in patients who underwent coronary bypass surgery or angioplasty before her finals in the same hospital (Dr. M van de Brand en Dr. R Erdman), and she investigated consequences of waiting for a revascularisation intervention at the Institute for Medical Technology Assessment (Dr. A. Meijler). In 1996 she obtained her medical degree. She worked three months at Cardialysis, before she began the studies as described in this thesis. In 2000 she achieved her Master of Science degree in Clinical Epidemiolgy at the Netherlands Institute for Health Sciences in Rotterdam. From March 2000, she started working as a Medical Scientific Advisor at Bristol-Myers Squibb in Woerden, and since July 2000 she is a Junior Product Manager for this company.

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