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Short communication

## Long term success of short smoking cessation seminars supported by occupational health care

H. Moshammer, M. Neuberger \*

*Department of Preventive Medicine, Institute of Environmental Health, Medical University of Vienna,  
Kinderspitalgasse 15, A-1095 Wien, Austria*

### Abstract

The objective of this longitudinal (3 year) study was to determine predictors of abstinence in 515 employees of a steel plant (28% female, age 18–67 years) after participation in Allen Carr seminars (intensive group counselling in a single session of 6 h). Answers given in computer aided phone interviews were analysed by stepwise and Cox regression. Of 510 responding persons 262 (51.4%) reported continuing abstinence. In a random sample of 61 respondents cotinine concentration in urine was measured, showing high agreement with smoking history. Social support increased abstinence, which was more persistent in males and office workers. Also in female participants the non-smoking spouse was a significant predictor for abstinence while a higher body weight predicted relapse. Relapsed female smokers did not show a sustainable reduction of cigarette consumption. Compared to cessation clinics higher population coverage would be achievable by workplace seminars. Every second smoker motivated to participate seems to be able to quit even without medication and to stay abstinent. Especially in females these seminars should be followed by physical exercise and continued support of gender specific occupational health care. © 2006 Elsevier Ltd. All rights reserved.

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### 1. Introduction

Since cessation rates in the general population have been reported to increase with the introduction of smoke-free workplaces (Burns, Shanks, Major, Gower, & Shopland, 2000; Fichtenberg & Glantz, 2002) many countries added workplace interventions to the priorities of tobacco control. Appropriate legislation was still missing when this study was performed in the largest steel company of Austria, which has a long

\* Corresponding author.

E-mail address: [manfred.neuberger@meduniwien.ac.at](mailto:manfred.neuberger@meduniwien.ac.at) (M. Neuberger).

tradition of preventive occupational medicine and decided already in 1999 to offer free seminars for smoking cessation to its workforce, using the services of Easyway® and the method of Carr (1991, 1998, 2002). The aim of this study was to analyse the determinants for successful quitting (Fergusson et al., 2003) over a longer period of time and in a less heterogeneous occupational setting than the only study having evaluated such seminars before (Hutter, Moshhammer, & Neuberger, 2006), which are used for smoking cessation at the workplace in many European countries.

Recent reviews concluded that there is not enough evidence yet to know whether group therapy is as effective as individual therapy (Lancaster & Stead, 2005) and that workplace programs for smoking cessation increase cessation in persons already motivated (Smedslund, Fisher, Boles, & Lichtenstein, 2004) and reduce the number of cigarettes smoked during the workday only, with conflicting evidence about whether they reduce overall cigarette consumption by smokers (Moher, Hey, & Lancaster, 2005). These conclusions seem to be based on studies mainly focused on pharmacotherapy. Both population studies (Ferguson, Bauld, Chesterman, & Judge, 2005) and clinical trials (Lancaster & Stead, 2005) using pharmacotherapy reported 1-year abstinence rates around 15% only. In one study the combination of nicotine and bupropion reached success rates of 35.5% compared to placebo (Jorenby et al., 1999), but with counselling sessions of 15 min or less the motivational part did not seem to be of primary importance and was not evaluated separately.

## 2. Participants and methods

The method of intervention (intensive group counselling in a single session of 6 h) has been described previously (Hutter et al., 2006): The trainer tells the participants to keep smoking while they listen to him so they can analyse why they do it. He makes the smoker discover that most cigarettes he is not smoking for enjoyment but because of addiction. Instead of going “cold turkey” and feeling deprived, the smoker should feel that he is doing something positive and looking forward to a great life. A significant and sustainable improvement of subjective life quality after the seminar has been proven. Such seminars were organised by a large Austrian steel company. They were open for everybody but mostly advertised within the company which allowed their employees to attend the seminars during working time. From November 1999 to December 2001 a total of 1311 persons participated, including spouses, other family members and partners of employees. Only afterwards it was decided to evaluate the success of the seminars, but only the names of the participants were available then. From these participation lists persons were sought in chronological order in the telephone directory of the steel factory. When 792 participants had been checked 686 of them were found in the directory and of these 171 (25%) were not reached in 4 attempts. Of 515 contacted between December 2003 and November 2004 five persons (1%) refused an answer (despite of confirmation that all personal data would be stored at the university only and destroyed after calculations to guarantee anonymity). Table 1 gives the basic characteristics of the study group before intervention as reported by the 510 persons retrospectively. While all respondents answered the questions regarding current smoking behaviour, the full set of answers was only provided by 483 participants. So not all statistics are based on exactly the same number of subjects.

The computer aided phone interviews were based on a standardised form including questions concerning previous and current smoking behaviour and personal factors as detailed below. The answers were analysed for duration of abstinence after the seminar by Cox regression, using SPSS 11.5. Multiple stepwise regression analysed four groups of determinants: a) smoking behaviour before the seminar:

Table 1  
Description of subjects ( $n=510$ ) prior to intervention for the whole group and by outcome

	Mean	Range	S.D.	Mean abstinent	Mean relapse
Age	42.23	18–67	9.05	42.91	41.44
Females %	28			24.8	30.4
Blue collar (manual) workers %	42			38.3	45.2
Body mass index (BMI)	25.64	17.48–56.76	3.85	25.59	25.70
Age at begin of smoking	21.91	10–50	5.99	21.92	21.90
Years smoking	20.35	1–47	9.15	21.07	19.58
Daily number of cigarettes	26.21	10–50		27.21	25.22
wish to quit: 1 (little) – 5 (strong)	3.40	1–5	1.30	3.38	3.42
Health: 1 (good) – 5 (poor)	2.79	1–5	0.81	2.93	2.64
Prone to infection: 1 (no) – 5 (much)	1.99	1–5	0.98	2.16	1.80

number of daily cigarettes and years smoking; b) personal and socio-economic: sex, age, blue (manual)/white collar (office) worker, shift work; c) weight and subjective health before the seminar (general status of health and susceptibility to infections). The latter two were presented in 5 categories each; the responses were treated as equally distributed nominal variables. The effect estimates are presented as per one unit change; d) psychosocial: number of work-mates in seminar, smoking status of spouse/partner, strength of own wish to stop smoking, smoking ban at the workplace. (At the time of the study smoking was not banned because of protection of non-smokers, but only at few workplaces because of fire hazard). Each group of determinants (a–d) was analysed separately: Originally all determinants of each group were entered into the model but then starting with the least influential variable (highest  $p$ -value) all variables with  $p > 0.2$  were excluded stepwise.

For biochemical validation of results the following procedure was agreed with the workers' council: From routine preventive screening examinations of all workers after the telephone survey (offered as a free health screening including electrocardiogram, blood and urine tests without connection to the previous seminar) parts of urine samples were used until 30 participants with a history of continuing non-smoking and 30 participants with a history of relapse to smoking had been tested for excretion of cotinine. This way urine samples of 61 persons were collected, cotinine concentrations were analysed and related to daily number of cigarettes smoked. Kappa values as measure of agreement between smoking history and urinary cotinine were calculated.

### 3. Results

In random samples of 30 smokers and 31 non-smokers according to history the agreement with results from urinary cotinine concentrations was high: The Kappa was 0.9 with a cut-off at 600 ng/ml. Reported number of cigarettes was correlated significantly with urinary cotinine concentrations ( $r=0.84$ ). Urinary cotinine concentrations in 5 persons reporting relapse to smoking were found to be below 600 ng/ml, while in 5 persons reporting continuing abstinence they were found above this cut-off. Repeated tests of the latter revealed occasional smoking in one case and non-smoking confirmed by cotinine concentrations below 600 ng/ml in 4 cases. In the biochemical validation it is important to remember that both relapsers and abstinence maintainers exposed to environmental tobacco smoke (ETS) can present higher cotinine concentrations than expected (Shaffer, Eber, Hall, & Bint, 2000). Tests for cotinine used to validate

smoking histories have been reported to achieve a sensitivity of 96–97% and specificity of 99–100% (Jarvis, Tunstall-Pedoe, Feyerabend, Vesey, & Saloojee, 1987).

At interviews conducted 2–4 1/2 years (mean 3 years) after the seminar no participant reported use of bupropion and 10 of the 12 participants who used nicotine replacement therapy (NRT) had a relapse to smoking. Of the 27 participants who answered only to the question on smoking status 13 reported continuing non-smoking (48.1%). Of the remaining 483 persons (348 males, 135 females) who gave a complete interview, 249 (51.6%) reported continuing non-smoking and 234 (48.4%) reported relapse to smoking. Assuming all 5 persons who did not answer to be smokers, the total relapse rate was 49.1%. Most relapses occurred shortly after the seminar; only a single person reported relapse after more than two years of abstinence.

Selected determinants for long term success of the seminar are shown in Table 2 and Fig. 1. Smoking behaviour before the seminar did not influence cessation. In the total group social support was found most important. Long term success was significantly better if more work-mates from the same department participated in the seminar and if the spouse/partner did not smoke. Relapse was more frequent in blue collar workers, but even in this group stayed below 60%. Males stayed abstinent more often than females, and relapsed male smokers had reduced their cigarette consumption more (−3.8 cigarettes/day on average) than relapsed female smokers (−2.6). Successful participants reported more frequently about a poor status of health before the seminar. This was not seen when females were analysed separately ( $p=0.918$ ): In contrast to the general results which are dominated by males, abstinence in females was influenced by body weight before the seminar. With higher weight a trend to earlier relapse ( $RR=1.021$ ,  $p=0.061$ ) was seen. In females only the association with the smoking behaviour of the spouse/partner reached statistical significance ( $RR=2.77$ ,  $p<0.001$ ).

Table 2

Determinants of relapse to smoking (only variables with  $p<0.2$  remained in the final model)

	Termination of abstinence (cox-regression)			Females: RR ( $p$ )
	RR	95% CI	$p$	
<i>Smoking before seminar</i>				
Cigarettes per day	0.989	0.977–1.002	0.087	−(0.991)
Years smoking	–		0.458	−(0.254)
<i>Personal data</i>				
Male	0.731	0.534–1.0	0.05	–
Age (per year)	0.988	0.973–1.002	0.10	0.981 (0.112)
Shift worker	–		0.675	−(0.742)
Blue collar (manual) worker	1.318	0.991–1.753	0.058	−(0.718)
<i>Status of health before seminar</i>				
Body weight	–		0.613	1.021 (0.061)
Poor general health	0.808	0.686–0.952	0.011	−(0.937)
Susceptibility to infections	0.785	0.674–0.913	0.002	0.745 (0.027)
<i>Psychosocial factors</i>				
Smoking ban at workplace	–		0.48	−(0.631)
Strength of wish to stop smoking	–		0.95	−(0.951)
Number of participating work-mates	0.942	0.907–0.979	0.002	−(0.424)
Smoking spouse/partner	1.742	1.22–2.488	0.002	2.772 (<0.001)

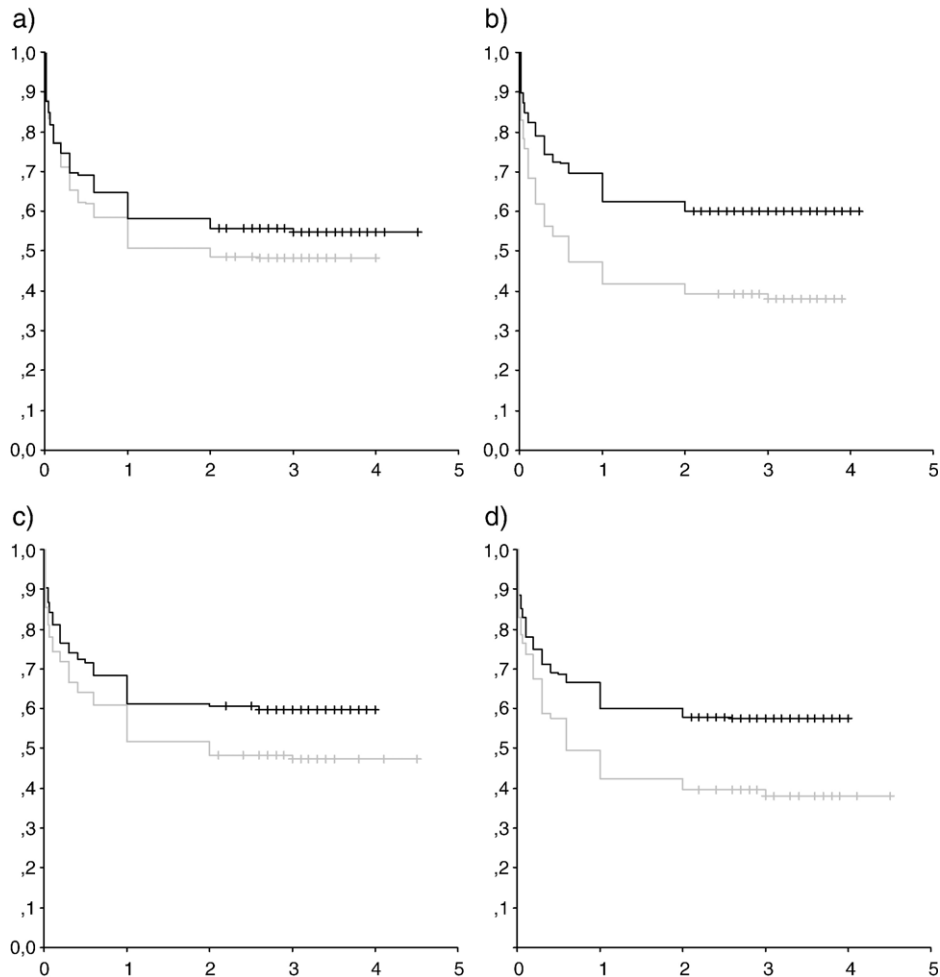


Fig. 1. Kaplan–Meier plots of abstinence rate over 1500 days each: a) White collar workers (black) versus blue collar workers (grey); b) Non-smoking spouse / partner (black) versus smoking spouse / partner (grey); c) More than 6 participants at the seminars from the same work-place (black) versus 6 or less participants (grey); d) Poor health (3–5) before the seminar (black) versus good health (1 and 2, grey). Y-axis: percentage of non-smokers, X-axis: years.

At the time of the interview the relapsed persons reported a less favourable development of general health and higher susceptibility to infection ( $p < 0.001$ ), both related to the number of cigarettes per day. While relapsed females kept their weight (on average a reduction of 0.94 kg was reported) the weight of the abstinent females increased by 4.4 kg.

#### 4. Discussion

Self selection of highly motivated persons has to be considered as a possible cause for unusually high success rates, however, seminars at the workplace should suffer less from this selection bias than studies

on persons seeking medical aid, and they have the advantage of addressing smokers in early motivational stages (Pisinger, Vestbo, Borch-Johnsen, Thomsen, & Jorgensen, 2005), who otherwise would not have consulted a doctor. Unfortunately it was not possible to interview a control group of workers who did not participate in a seminar. From routine representative health interviews (Statistik Austria, 2002) in Upper Austria (where the enterprise is located) an annual quit rate of 3% was estimated (weighting by 5-year age groups and sex). Routine histories of the occupational health department also showed that self-help quit rate was negligibly low in this enterprise before 2002 when implementation of the amendment of the workers protection law started.

Selection bias cannot be excluded, but important selection of smokers highly motivated to quit seems unlikely, because quit rates of participants in the first seminars offered at this company (assumed to be the ones already motivated to quit) were not higher than of participants in later seminars. Some selection bias might be due to accessibility by telephone, which could not be corrected according to Neuberger and Raber (1983), because of missing data. If age or shift work influenced accessibility by phone, bias would have been negligible, because they had moderate to none effect on cessation (Table 2). Only in case that blue collar workers were less accessible by phone than white collar workers some overestimation of success rates would have to be taken into account. A relevant influence of accessibility by sex is not likely.

Treating non-responders as smokers in smoking cessation research may underestimate the true effect of cessation treatment (Tomson, Bjornstrom, Gilljam, & Helgason, 2005), but even making the conservative assumption that all non-respondents had failed to abstain, the cessation rate after 3 (2–4.5) years was 49.1% and after consideration of persons with incomplete answers and controlling for cotinine in addition it was 47%.

Questions of validity have been discussed for telephone interviews used for surveys of scattered populations (Li, Langholz, Salam, & Gilliland, 2005; Perez-Stable et al., 2001) and occupational cohorts (Osinubi et al., 2003). Underreporting (Luepker, Pallonen, Murray, & Pirie, 1989) seems to be negligible compared to other differences in cessation studies: Comparisons of smoking prevalence estimates derived from surveys using telephone versus in-person interviews have shown that the former are generally 1 to 3 percentage points below the latter. For adults, these concerns relate more to measures of the number of cigarettes smoked per day than to the classification of whether a person is a current smoker (National Research Council, 1986).

The determinants for successful quitting partly corroborate earlier results of Scandinavian studies on smokers who had entered a cessation contest (Tillgren, Haglund, Ainetdin, & Holm, 1995). Korhonen, Su, Korhonen, Uutela, and Puska (1997) list the following determinants as important: male sex, age >40 years, living with a partner, low level of withdrawal symptoms, two or less previous quitting attempts, and support received from both health professionals and from lay persons (but not medication). We identified the non-smoking partner and the quitting work-mate as positive influences. If the colleagues cease tobacco consumption, then participants will have a reduced smoking setting, which can influence their own consumption (Font-Mayolas & Planes, 2000).

The results of the present study confirm that there is still a need to improve the seminars and aftercare with regard to the special needs of women and to stress the importance of physical exercise during cessation. In general, however, the method successfully transmitted the positive feelings of a life after smoking cessation. In quitters general health scored by SF-36 improve (Hutter et al., 2006). After relapse at least the number of cigarettes smoked was reduced significantly. Reduction of daily smoking was also related to smoking bans at the workplace (Fichtenberg & Glantz, 2002). If smoking bans would protect the total workforce from passive smoking, they could increase the cessation rate, too, and even motivate employees to stop smoking who did not want to participate in the seminars up to now. In California smoke-free workplaces were associated with a

reduction of total cigarette consumption of 29% due to 3.8% reduction in smoking prevalence and 3.1 fewer cigarettes smoked per day per continuing smoker (Fichtenberg & Glantz, 2002), but in Austria tobacco legislation still needs to be developed for achieving such goals.

The results of this study also support conclusions on effectiveness of methods from an Australian study on general practice patients (Doran, Lisa, Maxine, Helena, & Richard, 2006) that smokers relying on pharmacological aid have much lower success rates than those quitting ‘cold turkey’. But since most relapses occurred during the first weeks and months supportive care should be intensified during this crucial period.

Our study in a large steel plant suggests that every second smoker motivated to quit smoking can achieve permanent abstinence after only 6 h of professional counselling at his workplace, followed by occupational health care and supported by work mates and family. Cessation seminars should be adapted to special needs of women and blue collar workers. To enlarge the group of smokers willing to quit or to reduce their tobacco consumption improvements are needed in tobacco control legislation.

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