

SMOKING AND THE WORKPLACE: REALITIES AND SOLUTIONS*

**J.E. Henningfield,¹ L.M. Ramström,² C.G. Husten,³ G.A. Giovino,³
B.P. Zhu,³ J. Barling,⁴ C. Weber,⁵ E.K. Kelloway,⁶ V.J. Strecher,⁷
M.J. Jarvis,⁸ J. Weiss⁹**

¹Clinical Pharmacology Branch, NIDA Addiction Research Center, Francis Scott Key Medical Center, Baltimore, Maryland, USA; ²Institute for Tobacco Studies, Stockholm, Sweden; ³Epidemiology Branch, Office on Smoking and Health, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ⁴School of Business, Queen's University, Kingston, Ontario, Canada; ⁵School of Industrial Relations, Queen's University, Kingston, Ontario, Canada; ⁶Department of Psychology, University of Guelph, Ontario, Canada; ⁷Health Communications Research Laboratory, School of Public Health, University of North Carolina, Chapel Hill, North Carolina, USA; ⁸National Addiction Centre, Institute of Psychiatry, London, UK; ⁹Cahners Healthcare Communications, Excerpta Medica Inc., Belle Mead, New Jersey, USA

Abstract

Smoking imposes important costs on employers in terms of increased healthcare expenses and lost productivity due to absenteeism. However, smoking cessation programmes in the workplace may achieve substantial cost savings and productivity benefits, as indicated by new data showing that workers who have stopped smoking for at least a year lose significantly fewer work days and have significantly less morbidity than those who continue to smoke. Moreover, morbidity, absenteeism and use of healthcare resources will eventually be comparable between former smokers and individuals who never smoked. The workplace seems an almost ideal setting for smoking cessation intervention, particularly if restrictive smoking policies are in place, and may also be especially good for reaching blue-collar and unskilled workers. Smoking cessation treatment is more cost-effective than many other accepted medical practices, such as pharmacological treatment of hypertension or hypercholesterolaemia. For smokers with strong nicotine dependence, interventions that include nicotine replacement appear to be clearly more cost-beneficial than non-pharmacological therapies alone. Programmes tailored to a smoker's own ideas about the benefits and drawbacks of quitting offer a promising new approach to intervention. Further trials are necessary to establish the optimal form of intervention and to assess the value of nicotine replacement in the workplace setting.

Key words: Smoking cessation, workplace, cost-effectiveness, cost-benefit, nicotine replacement

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Address correspondence to Dr Jack E. Henningfield, NIDA Addiction Research Center, 4940 Eastern Avenue, Building C, Baltimore, Maryland 21224, USA.

Introduction (J.E. Henningfield)

We can now say with assurance that smoking cessation treatments are generally less costly, less toxic and more effective in reducing morbidity and mortality than treatments for diseases caused by smoking. However, attempts to encourage governments to offer large-scale smoking cessation and prevention programmes have met with limited success. One of the major stumbling blocks has been the oft-repeated claim that tobacco taxes are a contribution to most national economies that outweighs the health advantages of smoking cessation. This article will attempt to show that, although health benefits are the main reason for promoting smoking cessation, the economic consequences actually support – rather than negate – the health reasons for smoking cessation. This holds true for the workplace as well. Thus, the purpose of this article is to provide information that could be useful to corporate leaders when considering whether to initiate smoking cessation programmes.

The workplace may be an almost ideal context for smoking cessation programmes since employees are present day in and day out and are accessible to motivation by special incentives. However, since business, like government, tends to focus on short-term gain, the promise of long-range health benefits is unlikely to stimulate initiation of smoking cessation programmes in the workplace. Thus, an essential premise is that we must focus on the specific costs of smoking and the specific benefits of cessation that are within the life cycle of corporate and political leaders. For example, the risk of heart disease begins to fall within 1–2 years after smoking cessation.

Non-fatal respiratory infections, problems during pregnancy, and excess sickness among children may also decline quickly after smoking cessation. Note the immediate connection between an apparently non-workplace problem – sick children – and an obvious workplace problem – parental absenteeism. New quantitative data show how much employees who smoke cost a company in terms of lost

productivity and suggest that these costs might be recouped within a few years through corporate smoking cessation programmes that result in restored productivity. These findings offer hard evidence that it can indeed be cost-effective for corporations to offer smoking cessation treatment in the workplace.

Health benefits of smoking cessation (C.G. Husten)

Smoking cessation has a favourable impact on overall morbidity and mortality for men and women of all ages. Moreover, the benefits (Table 1) begin to accrue soon after cessation. Former smokers live longer than persons of the same age who continue to smoke. The risk of death within the next 15 years for former smokers is half that for persons who continue to smoke [1].

Cardiovascular disease

The likelihood of myocardial infarction starts to decline shortly after smoking cessation and drops significantly within 1–2 years [1]. Smoking cessation not only substantially reduces the risk of *developing* cardiovascular disease but it also affords health benefits for individuals with *existing* cardiovascular disease.

Table 1. Health benefits of smoking cessation.

Reduced risk of:

- Myocardial infarction
- Cardiovascular disease
- Stroke
- Lung cancer
- Oral cancer
- Oesophageal cancer
- Pancreatic cancer
- Bladder cancer
- Cervical cancer
- Respiratory symptoms
- Respiratory infections
- Chronic obstructive pulmonary disease
- Low birthweight infants

Increased life expectancy

Cancer

Although the risk of lung cancer mortality decreases less rapidly than does the risk for cardiovascular disease, a reduction in risk does become evident within a few years after smoking cessation and continues over time. The risk of developing oral or oesophageal cancer is halved within five years of cessation, and the odds of bladder cancer likewise fall by 50% a few years after cessation [1].

Respiratory disease

Respiratory symptoms and respiratory infections are also reduced by smoking cessation. In individuals without chronic obstructive pulmonary disease (COPD), pulmonary function begins to improve within a few months of cessation, and the rate of decline reverts to that of people who have never smoked. (Note, however, that pulmonary function may remain permanently reduced from that of someone who has never smoked.) Smoking cessation also reduces COPD mortality [1].

Reproductive outcome

Smoking cessation improves reproductive outcome. Between 17% and 26% of cases of low birthweight could be prevented if all pregnant smokers were to stop smoking [1]. Although the sooner a pregnant woman stops smoking the better, smoking cessation can be beneficial up to 30 weeks of gestation and smoking cessation programmes for pregnant women have proven to be quite cost-effective [1].

Smoking status and work productivity

Numerous studies have shown that smoking status is related to overall morbidity among workers [2,3]; in addition, several studies have demonstrated that absenteeism rates are higher among smokers than non-smokers [2,4-6]. In fact, according to one study, absenteeism rates of smokers exceed those of workers who have such other risk factors as being overweight, alcohol use, hypertension, elevated cholesterol levels, sedentary life style, or failure to wear seat belts [6]. Moreover, workers who smoke

incur higher healthcare costs [3] and are less productive than their non-smoking counterparts [5,7]. Indeed, the US Congress' Office of Technology Assessment has estimated that smoking costs the nation \$68 billion annually (\$1,078 per smoker) in healthcare expenses and lost productivity [8].

US Centers for Disease Control and Prevention analysis* (C.G. Husten)

In a recent Centers for Disease Control and Prevention analysis (National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, unpublished data), the relation between smoking status and worker productivity was measured. This analysis combined weighted data from National Health Interview Surveys (a representative sample of the civilian, non-institutionalised population of the United States 18 years of age and older) conducted in 1987, 1988, 1990 and 1991. The most salient findings of this analysis show that former smokers who have quit for at least one year have lower morbidity, absenteeism and health-care costs than workers who smoke, and that they resemble never smokers in these outcome measures. Workers who were former smokers and people who had never smoked had 1.2 fewer physician visits in the last year than did current smokers. This difference is striking because smokers are less likely to visit their physicians for preventative services. Moreover, the number of work days lost within the last two weeks was comparable for former smokers and never smokers but 29% higher for current smokers, a statistically significant difference. Likewise, relative to current smokers, former smokers reported 14% fewer days of restricted activity and 20% fewer days spent in bed in the last two weeks, statistically significant differences. For both of these parameters, the former smokers closely resembled the never smokers. Although the difference in the number of hospitalisations between former smokers and current smokers did

*G.A. Giovino and B.P. Zhu contributed to the research.

not reach statistical significance, the number of days spent in the hospital was significantly lower (21%) for former smokers and never smokers than for current smokers. These findings indicate that although former smokers have only slightly fewer hospitalisations than do current smokers, the stays are shorter, suggesting less serious illness or, at least, less morbidity than those who continue to smoke.

Meta-analysis and combined Canadian-US data (J. Barling)

A meta-analysis of 25 studies* (approximately 80,000 people) reported between 1985 and 1991 that correlated smoking status and absenteeism has revealed that smokers miss an average of 9.88 work days each year, as compared with only 8.53 for non-smokers (J. Barling, E.K. Kelloway, C. Weber, unpublished data). (In this context, absenteeism is used as a proxy for productivity.) However, it is possible that this meta-analysis underestimated the actual difference, since the group of self-identified non-smokers may have included some current smokers and some people who had quit smoking very recently.

This caveat may also apply to three separate databases on medical problems contributing to smoker absenteeism, which were compiled from the Canadian General Social Survey (GSS) [9], Ohio State University's National Longitudinal Survey of Youth (NLSY) [10], and the 1990 Ontario Health Survey [11]. Somewhat paradoxically, according to these data, although respiratory disease and peptic ulcer were most prevalent among heavy smokers, former smokers had the highest incidence of hypertension, heart disease and digestive complaints as well as the greatest number of hospital admissions. However, this category may well have included persons forced to give up smoking for health reasons. It should also be noted that these data were not age-adjusted, and the cohort

of 'former smokers' included all those who had stopped smoking, irrespective of length of time since cessation. However, former smokers and non-smokers alike made fewer visits to emergency rooms and spent fewer days in bed due to illness than did current smokers.

Data from the NLSY (approximately 400 subjects) also demonstrated a linear correlation between the number of cigarettes smoked daily by mothers and the birthweight of the first-born children. The infants of non-smoking mothers averaged just over seven pounds at birth while the babies of women who smoked more than 25 cigarettes/day weighed less than six pounds on average. Moreover, the infants of smoking mothers spent more days in the hospital in the immediate postnatal period and had more physician visits during the first year of life than did the children of non-smokers. Clearly, among employed mothers, visits to the pediatrician translate into days lost from work.

When considering the total cost of smoking to an organisation, it is important to factor in not only days lost from work and the cost of hiring replacements for absent workers but also loss of approximately 45 min/day per worker for 'cigarette breaks'. (J. Barling, E.K. Kelloway, C. Weber, unpublished data).

Indirect consequences

Smoking also has a number of indirect but important consequences for workplace outcomes. According to an analysis of 1988 data from the GSS, job satisfaction is significantly lower among smokers than non-smokers. Furthermore, the more cigarettes smoked per day, the lower the job satisfaction. The GSS survey also suggested that smokers tend to get less sleep than non-smokers, which may well translate into decreased attention and concentration at work.

According to data from the GSS and the NLSY, more frequent alcohol consumption as well as binge drinking were also linked with smoking. The percentage

* A list of these studies may be obtained from Dr C. Weber, School of Industrial Relations, Queen's University, Kingston, Ontario, Canada K7L 3N6.

of respondents who had imbibed alcohol within the last year, the number of days alcohol was consumed in the last month and in the last seven days, and the number of occasions on which six or more alcoholic drinks had been consumed (binge drinking) were all higher among smokers than among former smokers and never smokers. Of particular concern from an economic standpoint was the finding that smokers were more accident prone. That is, 21.7% of smokers had been involved in a workplace accident, as compared with only 17.1% of former smokers and 12.8% of people who never smoked [2]. These differences serve to underscore the substantial cost benefits that can be achieved by initiation of smoking cessation programmes in the workplace.

Economic benefits of smoking cessation (L.M. Ramström)

When exploring the economic aspects of smoking cessation, it is important to recognise that cost and gain mean different things to individuals than they do to the society as a whole. For the individual smoker who quits, the costs of smoking cessation treatment fees, medications and other aids will eventually be more than offset by savings in tobacco costs and by higher income thanks to more pension payments over a prolonged lifespan and to fewer illness-related lost work days (which may mean reduction of income). For the society as a whole, the economy is primarily represented not by the budget of the central government, but rather, by the national accounts which describe the balance between the *use of resources* (public and private consumption and investments) and the *creation of resources* (the production of goods and services, valued as the gross national product or GNP).

Overall, it can be anticipated that the society will gain economically from smoking cessation as a result of the improved ability to work of former smokers and the subsequent increase in national productivity, i.e. an increase in GNP. Still, to assess the

economic efficacy of smoking cessation approaches for the society as a whole, we must determine whether the use of resources for cessation treatment (cost of healthcare staff and medications) is offset by the creation of resources through avoidance of smoking-related productivity losses and whether the increased cost for geriatric care (due to increased longevity of former smokers) is offset by the decreased cost for treatment of smoking-related illness.

It is a common belief that smoking cessation is economically detrimental to the society because reduced tobacco consumption could mean reduced tobacco tax revenues for the government. However, this is not actually the case. Tobacco taxes are irrelevant to the national accounts because they do not create but merely redistribute assets that have already been created by people at work.

Matching cost against gain measured in physical terms, such as the number of years of life saved, is usually referred to as a cost-effectiveness analysis (CEA). Matching cost against gain measured in monetary terms is referred to as cost-benefit analysis (CBA).

Cost-effectiveness analysis: a US example

As an example of a CEA it is instructive to compare two approaches to smoking cessation employed in primary healthcare settings in the US [12]. The first consists simply in physicians advising their patients who smoke to stop. With the more comprehensive approach, the physician's advice is supplemented with a prescription for nicotine gum. Gain is measured as number of years of life saved, which depends on, among other things, the age at which smoking cessation occurs. Thus, the calculated cost-effectiveness of adding the nicotine gum prescription varies according to age group, as illustrated in Table 2. In comparison, the cost of pharmacological treatment of hypertension or hypercholesterolaemia per year of life saved is more than twice as high as the corresponding cost of pharmacological treatment for smoking cessation, which

Table 2. Cost-effectiveness of adding nicotine gum prescription to physician's advice to stop smoking.

Age at intervention (yr)	Cost per year of life saved (US\$)	
	Males	Females
35-39	4,748	8,996
45-49	4,113	7,187
55-59	4,498	7,073

[Modified with permission from reference 12. ©1986 American Medical Association.]

makes pharmacological smoking cessation therapy at least twice as cost-effective as antihypertensive or lipid-lowering therapy [13,14].

Cost-benefit analysis: society-as-a-whole perspective

The gain from smoking cessation can also be measured in terms of potential gain in years of worker productivity rather than years of life saved. This measure can be translated into monetary gain, making it possible to go from CEA to CBA. Combining cost data from the example discussed above with data on productivity gain provides information on the expected GNP increase per quitter vs. the cost of smoking cessation per quitter [12,15]. As shown in Table 3, the gain from smoking cessation is highest for individuals with the highest

cigarette consumption levels who probably also have the strongest nicotine dependence.

Advice only vs. advice plus nicotine replacement: a cost comparison

Although the examples cited above illustrate basic principles of CEA and CBA as applied to smoking cessation, future studies must anticipate more ambitious programmes. Furthermore, the various subgroups of smokers must be distinguished, since nicotine replacement therapy (NRT) makes a substantially greater difference for individuals with strong nicotine dependence than for those with weak nicotine dependence.

A model smoking cessation protocol consists of an initial visit where the patient is advised to quit, with or without a prescription for NRT, a follow-up phone call after seven days, a follow-up visit after 14 days, a second follow-up visit after 30 days and finally, a personal letter after three months [16].

Baseline assumptions in this model are summarised in Table 4 and can be used to calculate new estimates of cost in terms of physician's time per additional quitter (Table 5). These estimates vary according to the level of nicotine dependence. For individuals with weak nicotine dependence, advice plus NRT costs just slightly more per additional quitter than advice alone. For subjects with strong nicotine dependence, advice plus

Table 3. Cost-benefit of adding nicotine gum prescription to physician's advice to stop smoking (increase in GNP per male quitter in US\$).

Age of intervention (yr)	Cigarette consumption level		
	High	Moderate	Low
35-39	37,838	20,973	11,560
45-49	21,723	12,192	7,206
55-59	6,624	3,654	2,263
Average cost per male quitter (US\$) 4,069			

[Based on US conditions. Sources: references 12 and 15.]

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Table 5. Cost combined th intervention per addition

Approach

Advice only
Advice plus ↑

Table 4. Baseline assumptions in smoking cessation programme model.

Rate of compliance	90%
<i>Quit rate if nicotine dependence is weak</i>	
No intervention	14%
Non-pharmacological therapy	24%
Combined therapy including nicotine replacement	32%
<i>Quit rate if nicotine dependence is strong</i>	
No intervention	4%
Non-pharmacological therapy	5%
Combined therapy including nicotine replacement	25%

[Based on data from reference 16.]

NRT costs substantially less per additional quitter than advice alone. Moreover, smokers who are strongly dependent on nicotine usually have a high cigarette consumption level. As has already been shown in Table 3, quitters from this category yield a higher GNP increase than do members of other categories, which further underscores the advantages of NRT relative to advice alone.

Future steps: making workplace cessation pay (V.J. Strecher)

The key to establishing smoking cessation programmes in the workplace is, of course, to persuade the employer of the economic costs of employees who smoke and the economic benefits of a successful smoking cessation programme. The next crucial step is to orchestrate a combination of workplace smoking policy with cessation option. The rationale behind this combination is that there is little evidence to suggest that smoking policies *per se* actually help people quit smoking. However, worksite smoking

policies and, in particular, total bans, do increase the proportion of smokers who sign up for a smoking cessation programme if one is available.

Experience has shown that self-help pamphlets or brochures yield high participation rates but low smoking cessation rates. On the other hand, formal smoking cessation programmes attract considerably fewer participants but have success rates as high as 30%. In fact, a recent study showed that only 2% of smokers receiving NRT were taking part in a formal smoking cessation programme [17], which suggests that, to most smokers, group programmes may be less palatable than self-help or minimal-contact approaches. The challenge, therefore, is to increase the effectiveness of these self-help or minimal contact programmes.

A major drawback of smoking cessation programmes is that 'one size does not fit all.' That is, each smoker has his or her own set of perceived benefits of quitting smoking, such as, pleasing one's friends or family members, saving money, and improving one's health. Similarly, every smoker has his or her own set of barriers to quitting, with stress or anxiety ranking as the number one obstacle, followed by fear of gaining weight, fear of failure, peer pressure and nicotine addiction [18]. Thus, one logical approach would be to ascertain each smoker's set of perceived benefits and barriers and develop custom-tailored self-help programmes.

Table 5. Cost (US\$) of advice only and of combined therapy relative to non-intervention in terms of physician's time per additional quitter.

Approach	Nicotine dependence	
	Strong	Weak
Advice only	2,100	210
Advice plus NRT	201	235

Computer model for individualised self-help

The Health Communications Research Laboratory of the University of North Carolina has developed a computer programme that first collects information on perceived benefits and barriers from smokers who are patients of family physicians throughout the state [19]. The computer then creates a two-page, tailored, self-help programme that addresses the patient's personal concerns and matches his or her stage of cessation and self-efficacy level. In this way, the individual's specific needs can be met efficiently, without a deluge of extraneous information. Trials of this programme in physicians' waiting rooms have yielded 80% participation. In addition, four-month follow-up has revealed a 21% success rate among patients who had received tailored information, as compared with a success rate of only 7% among control patients who received standard untailored information ($p < 0.10$) [20]. The efficacy of the tailored message approach has also been confirmed in studies of dietary fat reduction [21] and mammography [22].

A variation of this approach has been designed to complement NRT. With this programme, smokers for whom NRT has been prescribed would call a toll-free hotline, on which an operator elicits information about the individual's projected quit date, specific smoking behaviours and perceived benefits and barriers. This information enables a computer to create personal smoking cessation calendars and postcard reminders that feature appropriately timed descriptions of the specific benefits the individual can expect from smoking cessation, as well as practical pointers for overcoming individual barriers such as stress and weight gain. Short-term progress is assessed through regular follow-up telephone calls. Since the programme also provides physicians with a synopsis of their patients' outcome, patients who relapse can be recycled back into the programme.

Such an approach is also quite feasible for the workplace, where the information

acquired can be used to provide the employer with a user-friendly company database on smoking cessation and relapse rates, health benefits of cessation, and future target groups. To increase participation in the workplace setting, a menu of different strategies can be offered, including group or buddy programmes.

Discussion and conclusions

(M.J. Jarvis)

Why should employers invest in smoking cessation programmes in the workplace? The argument that employers should concern themselves with the health and welfare of their workers can be bolstered by sound economic reasons, a number of which have been set forth in this article. First, nearly half of all smoking-related deaths occur in middle-aged people, resulting in an average loss of 23 years of life [23] and enormous cost to the employer in terms of lost productive potential. Second, increased morbidity among smokers imposes on the employer not only the continual burden of absenteeism costs but also higher healthcare expenses. In fact, according to an estimate from the DuPont Corporation, there is an annual excess illness cost of \$960 for each smoker employed by the company [24]. Third, smokers appear to have higher accident rates than non-smokers, which makes them more costly to their employers. And finally, smoking cessation programmes should lower the chances of litigation brought by claimants who have sustained health damage due to exposure to second-hand smoke in the workplace.

There is, however, a limitation of the workplace that must be taken into account, *viz* that a smoker's home situation is an important determinant of the likelihood of giving up the habit. For example, a smoker married to another smoker is three times less likely to quit smoking than one with a spouse who never smoked. On the other hand, a smoker married to a former smoker is significantly more likely to stop smoking (M.J. Jarvis, unpublished data). Nonetheless, the workplace is also a social setting where

norms and expectation inculcated.

This article has shown that smoking cessation interventions can be effective, particularly in the workplace. An important question remains: What workplace interventions are most likely to provide a motivation for achieving abstinence? The use of incentives such as prize drawings has been found to be effective, particularly in the workplace. The use of incentives to provide a motivation for achieving abstinence has been found to be effective, particularly in the workplace. The use of incentives to provide a motivation for achieving abstinence has been found to be effective, particularly in the workplace.

Individually tailored interventions represent an excellent approach to smoking cessation. They are more effective than standard interventions, and they are more cost-effective. They are also more appealing to smokers, and they are more likely to be used. They are also more likely to be used in the workplace. They are also more likely to be used in the workplace. They are also more likely to be used in the workplace.

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norms and expectations about smoking are inculcated.

This article has shown that smoking cessation interventions are highly cost-effective, particularly when compared with other health interventions. However, the question remains: Which forms of intervention are most likely to succeed in the workplace? The use of monetary incentives to provide a motivational boost for achieving abstinence is one simple intervention that has been tried. In one study, for example, continuing abstinence (verified by carbon monoxide testing) was rewarded with \$10.00 monthly bonuses and lottery prize drawings. Despite its inherent attractiveness, however, this motivational approach proved insufficient to achieve significantly higher cessation rates than controls [25].

Individually tailored approaches may represent an excellent means of engaging smokers more effectively in the intervention being offered, and may prove very important if confirmed in larger randomised trials. Nicotine replacement would seem to be a natural adjunct to workplace intervention. Current evidence favours making it available to all smokers irrespective of their level of nicotine dependence and whether or not a tailored approach is followed. Indeed, a randomised workplace intervention trial has demonstrated significantly higher one-year abstinence rates among workers who received NRT than among those who received advice only [26,27]. These findings suggest that nicotine replacement programmes should be incorporated into workplace smoking cessation interventions.

In conclusion, smoking imposes very high costs upon employers, but smoking cessation programmes may help companies realise important cost savings and productivity benefits. The workplace is an excellent setting for smoking cessation, particularly where smoking policies are in place, and may be an especially good route for reaching blue-collar and unskilled workers. Since most workplaces include both smokers and non-smokers, the ultimate acceptance of a workplace smoking policy may hinge on the sensitivity and pace with which it is introduced and implemented. More trials are necessary to determine the optimal form of intervention, in particular, to evaluate the efficacy of individualised programmes and the role of nicotine replacement in the workplace setting.

Potential reduction of smoking-related mortality and morbidity through smoking cessation is what motivates public health workers and is certainly the prime motivation of smokers who seek help in quitting the habit. However, government and industrial policy makers are more likely to be motivated by the adverse effects of smoking-attributable morbidity on productivity in the workplace and in society-at-large and the potential reversal of these productivity losses by smoking cessation.

Although the true costs and benefits of smoking cessation programmes will only be revealed with time, it is hoped that this article has provided quantitative tools for persuading business leaders of the measurable economic gains to be achieved by organising smoking cessation programmes in the workplace.

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PREDICTING FINDINGS FROM THE SMO

P.T. Donnan,
Health Educator

Abstract

In September 1993, the Health Education Society of Canada launched a freephone helpline strategy of the 16+ years, wh

After six months, the helpline had attempted to reach 100,000 tar brand. This was associated with previous significant or associated with over follow-up exposed to nicotine beginning.

Key words: I

Introduction

Smoking has been a high priority for health educators. According to the latest data, approximately 28% of the 16+ year olds continue to smoke. The reduction in smoking-related deaths has slowed down in each year [2]. This is a threat to public health. The Board for public health in September 1993 launched a smoking camp.

Address correspondence to:
Edinburgh EH10 4