Randomized controlled trial of anti-smoking advice by nurses in general practice

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SUMMARY. Practice nurses are playing an increasingly prominent role in preventive care, including the provision of anti-smoking advice during routine health checks. A randomized controlled trial was designed to assess the effectiveness of anti-smoking advice provided by nurses in helping smokers to stop smoking. A total of 14 830 patients aged 16–65 years from 11 general practices completed a brief questionnaire on general health, incuding smoking status, at surgery attendance. The doctor identified 4330 smokers and randomly allocated 4210 to control or intervention groups. The doctor asked those in the intervention group to make an appointment with the practice nurse for a health check. The attendance rate at the health check was 26%. Smokers were sent follow-up questionnaires at one month and one year, and those who did not respond to two reminders were assumed to have continued to smoke. There was no significant difference in reported cessation between the intervention and control groups at one month or one year. However, there was a significant difference in the proportion of patients who reported giving up within one month and who had not lapsed by one year — 0.9% in controls and 3.6% in the intervention group (P<0.01). Nevertheless, the effect of the nurse intervention itself may be small as the sustained cessation rate in attenders was only 42.4% higher than in non-attenders. The deception rate in reporting cessation, as measured by urinary cotinine, was of the order of 25%.

Introduction

TOBACCO smoking is the most important cause of preventable disease and premature death in developed countries[1] and control of cigarette smoking could achieve more than any other single measure in the field of preventive medicine.[2] In the UK smoking causes at least 100 000 premature deaths each year and in 1984 the cost to the National Health Service of treating smoking related diseases was estimated at more than £165 million.[3]

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The great majority of those who smoke wish to stop and many try to do so.[4] Mass media campaigns help to motivate smokers to stop smoking, but are relatively ineffective in helping them to do so.[5] 'Smokers clinics' can offer effective help but are few in number, attract only highly motivated smokers and cannot, therefore, provide help on the scale required.[6] General practitioners, on the other hand, see the majority of smokers on their practice lists at least once a year and are expected by their patients to take an active interest in behaviour that affects health, including smoking.[7] Moreover, advice from general practitioners has been shown to be effective in helping patients to stop smoking[8-10] and adjuncts to verbal advice which may enhance this effect include simple anti-smoking leaflets,[8] demonstration of exhaled carbon monoxide[9] and nicotine chewing gum, if properly used.[11] Consequently, primary health care is widely acknowledged as being of vital importance in health promotion generally,[12] and in smoking cessation in particular.[13] However, in many practices it is no longer the doctor but the nurse who provides most preventive care, including asking and advising about smoking as part of health checks which are being widely promoted.[14] The effectiveness of anti-smoking advice given by nurses remains unproven and the nurses themselves have expressed a lack of confidence in the effectiveness of their role.[15]

This paper reports a randomized controlled trial designed to investigate the effectiveness of practice nurses in helping patients to stop smoking when invited to receive a brief health check.

Method

The study took place in 11 general practices in the Oxford region, in which one or more of the nurses employed by the practice had expressed an interest in 'taking part in research on smoking' in a previous survey.[15] Before participating in the study each practice nurse received individual training in helping people to stop smoking, including attendance at two study days. List sizes varied from 3000 to 16 500 and none of the practices had undertaken routine screening programmes of health checks previously. Only three of the practices undertook vocational training.

During the recruitment period, which varied in length according to the size of the practice, all 14 830 patients aged 16 to 65 years attending surgery between Mondays and Fridays for an appointment with the doctor were asked to complete a questionnaire by the receptionist. This questionnaire included identifying details, demographic information, and brief questions on general health including smoking status. The patient gave the questionnaire to the doctor in the consultation. The 4330 smokers identified were intended to be allocated to a control or intervention group on a one to two basis according to the day of attendance. Although the doctors were given a desktop card to remind them which were control days and which intervention, 120 patients were allocated to the wrong group and were excluded from further analysis. The designation of specific days was itself randomized across weeks and practices, although the different recruitment rate in each practice meant that the exact 1:2 ratio was not achieved — 1310 controls and 2900 intervention patients were entered into the trial.

On control days, nothing further was done beyond usual care: the doctors were asked specifically not to discuss smoking beyond the requirement of the routine consultation. On intervention

days, smokers were asked to make an appointment with the practice nurse for a health check, described as a routine check to assess blood pressure and weight and to discuss general health. Only 25.9% (751) of the 2900 patients in the intervention group made and kept an appointment with the practice nurse for a health check. A further 3.8% (109) made an appointment for a health check but did not attend. The number of patients who attended on designated intervention days and were not in fact asked to make an appointment by the general practitioner is unknown, but may account in part for the low attendance rate.

The 751 smokers who attended for the health check were further randomized to two equal sized groups: advice only (375 patients) and advice plus carbon monoxide test (376 patients).

During the health check, blood pressure and weight were measured, family history of cardiovascular disease and cancer were discussed, and dietary and other health advice was given as necessary. The anti-smoking component consisted of advice and discussion, reinforced by written advice in the Health Education Council booklet *So you want to stop smoking?*, and the offer of a follow-up appointment. The same procedure was followed for patients allocated to the carbon monoxide group but in addition they were shown their level of expired air carbon monoxide using a Bedfont monitor, and its significance was discussed.

All attenders were followed up by a postal questionnaire at one month and one year. Random samples of one in two of the control group (642 patients) and of one in six of those who were randomized to the intervention group but did not attend for a health check (367 non-attenders) were similarly sent questionnaires one month and one year after their initial surgery attendance. Non-responders to the questionnaire were sent two reminders at intervals of three weeks.

In order to validate claimed smoking cessation, the patients in the control and attender groups who claimed to have stopped smoking at the one year follow up were invited for a further health check at which they were asked to provide a urine sample so that the level of cotinine, a metabolite of nicotine, in their urine could be measured. Four practices declined to participate.

Non-response to all three questionnaires at follow up was taken as an indication that the patient continued to smoke. Thus, percentages of patients not smoking and confidence intervals were based on the number of patients in the group (rather than the number of questionnaire responders). The attender and non-attender groups were combined by weighting the non-attenders by the inverse of the sampling ratio. The *P* values given are based on the t-test or chi-square test as appropriate. Confidence intervals are based on the standard error of a proportion.

Results

The mean age of the 751 attenders in the intervention group was 38.5 years while for the 2149 non-attenders it was 35.8 years ($P<0.01$). There was also a significant difference in the proportion of attenders and non-attenders in social classes 1 or 2 (attenders 24.4%; non-attenders 29.9%, $P<0.05$).

Of all 1760 smokers sent follow-up questionnaires only 59.2% completed them at both one month and one year; the response was similar in the controls (56.5%) and non-attenders (54.4%), but was significantly higher in the attenders (63.8%) ($P<0.01$). The percentage of smokers in each study group who reported that they had stopped smoking when followed up is shown in Table 1. At neither one month nor one year follow up was there a significant difference in reported non-smoking between the intervention group and the controls. At one month there was a significant difference in reported non-smoking between the attenders and the non-attenders ($P<0.05$), but not at one year. Surprisingly, the reported non-smoking rate was higher in all groups at one year than at one month.

The proportion of smokers who temporarily gave up smoking was far higher than those who achieved long term success (Table 1). In terms of the number of smokers reporting non-smoking at both one month and one year, and the number of smokers who claimed sustained cessation for one year, the intervention group performed significantly better than the control group ($P<0.01$). Moreover, the rate of sustained cessation in the non-attenders (3.3%) was intermediate to the rate in controls (0.9%) and attenders (4.7%) (chi-square trend 16.3, $P<0.001$).

Table 2 shows the effect of adding carbon monoxide monitoring to the nurse health check. Although the percentage of pa-

Table 1. Self reports of non-smoking at follow up: comparison between intervention and control groups.

	Percentage not smoking[a] (95% confidence interval)			
	One month follow up	One year follow up	One month and one year follow up	Continuously from one month to one year follow up[b]
Controls (n = 642)	5.3 (3.6– 7.0)	10.0 (7.7–12.3)	1.2 (0.4–2.1)	0.9 (0.2–1.7)
Intervention group				
Attenders (n = 751)	10.9 (8.7–13.1)	12.9 (10.5–15.3)	5.9 (4.2–7.6)	4.7 (3.1–6.2)
Non-attenders (n = 367)	6.5 (4.0– 9.1)	10.6 (7.5–13.7)	4.1 (2.1–6.1)	3.3 (1.4–5.1)
All (weighted average)[c]	7.7 (5.7– 9.7)	11.2 (8.8–13.6)	4.5 (3.0–6.0)	3.6 (2.2–5.0)

[a]Percentage of group total, assuming all non-responders still smoke. [b]Patients reporting non-smoking at one month and one year and who gave the date on which they last smoked as before the one month follow up. [c]Number of non-attenders weighted by inverse of sampling ratio (x 5.9).

Table 2. Self reports of non-smoking at follow up: comparison between attenders according to use by nurse of a carbon monoxide meter.

	Percentage of attenders not smoking[a] (95% confidence interval)			
	One month follow up	One year follow up	One month and one year follow up	Continuously from one month to one year follow up[b]
Advice and CO monitoring (n = 376)	11.7 (8.3–15.1)	13.8 (10.1–17.5)	5.9 (3.5–8.2)	4.8 (1.6–8.0)
Advice only (n = 375)	7.5 (4.4-10.5)	14.7 (11.4–18.0)	5.9 (3.5–8.2)	4.5 (2.4–6.6)

[a]Percentage of group total, assuming all non-responders still smoke. [b]Patients reporting non-smoking at one month and one year and who gave the date on which they last smoked as before the one month follow up.

tients who reported non-smoking at one month was slightly higher in the group receiving carbon monoxide monitoring, this difference was not statistically significant and the percentage reporting sustained non-smoking for one year was very similar (4.8% versus 4.5%).

Urine samples were obtained from 15 controls and 30 attenders who reported not smoking at the one year follow up. The cotinine assays indicated that eight of the attenders (26.7%, 95% confidence intervals 10.8–42.6%) and three of the controls (20.0%, 95% confidence intervals 0.0–40.2%) were regular or occasional smokers when they provided the urine sample. These deception rates are similar for patients who reported having given up at one year only (7/72, 25.9%) and for those who reported having given up at both one month and one year (4/18, 22.2%).

Discussion

An attempt to keep a formal record of whether a particular patient was asked to make an appointment by the general practitioners was abandoned early in the trial and, therefore, the extent to which the low attendance rate of 25.9% reflects a failure to offer a health check when appropriate is not known. Nevertheless, Pill and colleagues have recently reported a similarly low uptake of health checks by smokers with only 17% of attenders but 69% of non-attenders at health checks reporting that they had ever smoked.[16] If the majority of smokers are unlikely to attend health checks, then this in itself is an important limitation to the effectiveness of nurse anti-smoking advice at health checks. The observation that attenders were older than non-attenders suggests that this limitation may be particularly true for younger smokers.

The relatively high prevalence of not smoking at either one month or one year, but not both, underlines the need to measure outcome in terms of sustained cessation, as emphasized by the International Agency Against Cancer (UICC) guidelines on the conduct of trials of this nature.[13] There appears to be a population of smokers who frequently make transient attempts to stop smoking and render studies relying on single short-term outcomes difficult to interpret. In this study the difference in reported cessation between the control and intervention groups at one year (1.2%) is less than the difference in sustained cessation (2.7%) and this probably reflects random fluctuation in transient cessation.

In view of the low attendance rate for the health check it is of interest that there is a significant difference in sustained smoking cessation between the control and intervention groups. One explanation could be that the invitation by the general practitioner to make an appointment for a health check was itself an important anti-smoking intervention. This explanation is strengthened by the results of Russell and colleagues' study of minimal doctor intervention.[8] In Russell's 'questionnaire only' group, which is similar to our control group, the self-reported sustained cessation rate was 1.6%, while in his 'GP advice only' group, which is arguably similar to our non-attender group, the cessation rate was 3.3%. The fact that the cessation rate in our control group (0.9%) is lower than in Russell's study also raises the possibility that the general practitioners gave less advice to controls than they would normally, although this was contrary to the study protocol.

There is no doubt that self-reported cessation overestimates the true cessation rate — by about 25% in this study. Although the confidence intervals on the estimated deception rate are wide in this study the results are consistent with previous reports. The best validated recent study of self-reported smoking cessation, carried out by the British Thoracic Society, documented a deception rate of 27% at six months follow up and 25% at 12 months.[17] However, the self-reported cessation rate remains useful for comparative studies of effectiveness, as there is no evidence from this or previous studies that the deception rate is different in intervention and control groups.

The lack of effect of carbon monoxide monitoring is disappointing as a previous study had suggested that this might be helpful.[9] The relatively small numbers in the groups receiving advice with and without monitoring means that the power to exclude a small beneficial effect is limited, but there is no evidence for recent claims of a dramatic motivating effect.[18]

Trials of this type are fraught with methodological difficulty, and we have attempted to take a conservative approach throughout. However, the statistically significant difference between the intervention and control groups is dependent on the acceptance of a non-response to three questionnaires as a valid indication of continued smoking and the inclusion of the 25% of observations that may be deceptions. It should also be noted that the effect of the single nurse intervention described must be limited as the sustained cessation rate was only 42.4% higher in the attenders than in the non-attenders, despite the fact that the attenders are a selected compliant group.

Nevertheless, it must not be concluded that nurses cannot help smokers to stop smoking. It is quite possible that it is the context of the health check, at which a number of other measurements are made and at which other issues are discussed, which offers little scope for an effective nurse intervention. The cessation rate in the attender group was much lower than the smoking cessation rate recently reported by Richmond and Webster in Australia, which appears to have been achieved by intensive follow-up support of smokers as they gave up.[19] In view of our results, and the observation that about 10% of smokers claim to have temporarily stopped smoking at any one time, it is possible that the most appropriate role for the prevention nurse is not in giving initial advice to stop — which may be best done opportunistically by the general practitioner — but in the provision of longer term support and follow up which may be necessary to achieve sustained cessation.

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