A Pilot Study of Telephone-Based Smoking Cessation Intervention in Asbestos Workers

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*Smoking markedly increases the risk of asbestos-related lung cancer. We conducted a randomized pilot trial of a telephone-based smoking cessation intervention in asbestos workers. Fifty-nine smokers were assigned to either a control or telephone-based smoking cessation treatment group and were followed-up at 6 months. Intent-to-treat analysis revealed a 16.7% quit rate at 6 months for the intervention group compared to 6.9% for the control group (*P = *0.25). Treatment-received quit-rates were 33% for the intervention group and 6.9% for the control group (*P = *0.05). The intervention group was twice as likely to use smoking cessation medicines and progressed further along the stage of change continuum compared with the control group. Incorporating telephone-based smoking cessation treatment into medical screening activities for asbestos workers is feasible and the intervention is effective in increasing quit rates at 6 months.* (J Occup Environ Med. *2003;45:569–574*)

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Grant Sponsor: Robert Wood Johnson Foundation; Grant Number 035288.

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DOI: 10.1097/01.jom.0000063618.37065.ab

There is a growing disparity in smoking prevalence among occupational groups. For example, in the United States, blue-collar workers have higher rates of tobacco use (37% for men; 34% for women) compared with their white-collar counterparts (21% for men; 20% for women).[1] The observed occupational disparity in smoking prevalence is attributable in part to the differences in workplace tobacco use social norms, smoking restrictions policies, and cessation programs that are available to workers. White-collar workers are more likely to have policies that restrict smoking and/or smoking cessation programs at their workplaces. Blue-collar workers have higher risks of dual hazardous workplace exposures (eg, chemical carcinogens and smoking) but are less likely to have workplace policies that restrict smoking or to have cessation treatment as part of workplace health promotion programs.[2,3]

Asbestos-exposed workers represent one of the blue-collar groups with the highest risks of occupational lung cancer from dual hazardous exposures (ie, asbestos and smoking).[4–6] The International Agency for Research on Cancer's review of epidemiological studies of insulation workers suggests an interaction between smoking and high levels of asbestos exposure that approximates the multiplicative model.[7] One study showed that there is at least a 50-fold increase of lung cancer deaths in cigarette smoking asbestos workers compared with non-smoking and non-asbestos exposed workers, whereas lung cancer mortality in-

creases only 5-fold in nonsmoking asbestos workers.[6] The risk of lung cancer in former asbestos workers cannot be reduced by discontinuing asbestos exposure but smoking cessation for 10 to 15 years reduces lung cancer risk in asbestos exposed subjects by 60% to 70%.[6,8]

The Occupational Safety and Health Administration mandates periodic medical screening for asbestos workers. One of the requirements is that a detailed tobacco-use history be obtained at each screening encounter.[9] The clinical encounter during medical screening activities serves as a prime opportunity for risk communication regarding the interaction between asbestos exposure and smoking and to offer smoking cessation counseling and/or treatment.

A few studies have examined the unique role of occupational physicians in decreasing smoking among asbestos workers.[10–13] The cessation interventions have for the most part consisted of a one-time 3–5 minutes of behavioral counseling[10,11,13] or a one-time postal smoking cessation advice.[12] Asbestos workers who received physician intervention (counseling) had modest increases in quit rates compared to their counterparts who did not receive physician counseling or advice to quit.

Population-based smoking cessation intervention studies also demonstrate that physician counseling is effective in motivating smokers to make quit attempts. However, this type of intervention was shown to have little or no effect on the likelihood of successful long-term abstinence ie, remaining quit for 3 months or longer.[14] Studies have shown that telephone-based counseling is effective at improving quit rates.[15] There is some evidence to support that 30% of smokers who enroll in telephone-based smoking cessation counseling (FREE & CLEAR) will be successful at quitting at 6 months.[16] One of the ways of improving the effectiveness of physician counseling is to supplement physician quit advice with links to telephone-based behavioral counseling that also provide guidance on how to effectively utilize smoking cessation pharmacotherapies, thus providing continuous support to the quitter after the physician completes his/her intervention. This approach enables the smoker to obtain the psychological and pharmacological support s/he may need to be successful at long-term abstinence.

The objective of this feasibility study was to pilot a telephone-based smoking cessation treatment in workers that attended medical screening for asbestos-related diseases. We reasoned that by recruiting smokers into the intervention (ie, telephone-based cessation treatment) at the time of screening encounters, smoking cessation rates will increase and those who continue to smoke will exhibit progress along the *stage-of-change continuum (eg, from pre-contemplation to contemplation to preparation) as compared to brief physician counseling and advice to quit (control).

Materials and Methods

The Institutional Review Boards of the Mount Sinai School of Medicine (MSSM) and the University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School (UMDNJ-RWJMS) approved the study protocol.

Subjects

Subjects were recruited from workers who attended screening activities for asbestos-related diseases at the Mount Sinai-Irving J. Selikoff Center for Occupational Health (MSSM) and the Clinical Center of the Environmental and Occupational Health Sciences Institute at the UMDNJ-RWJMS. All individuals who admitted to current cigarette smoking were invited to participate and those who only used other forms of tobacco (eg, pipe, snuff, chewing tobacco etc) were excluded from the study. At the onset of the study, the following were obtained from each subject: informed consent, detailed smoking history, level of motivation to quit, the stage of change with regards to smoking cessation (stage of change continuum: precontemplation, not planning to quit in the next 6 months; contemplation, considering quitting in the next 6 months; preparation, planning to stop smoking within the next 30 days; action, first 6 months of smoking cessation),[17] and possible contraindications to use of smoking cessation pharmacotherapies (eg, a history of seizures, brain trauma and eating disorders preclude the use of Bupropion HCl [Zyban®]).

The subjects were randomized into either the intervention or control group using a sealed envelope method as follows.

Intervention Group (FREE & CLEAR). This group received brief physician advice to quit smoking. In addition, each subject was proactively enrolled with FREE & CLEAR, a telephone-based smoking cessation counseling program developed and administered by Group Health Cooperative of Puget Sound, Seattle, WA.[16] A unique advantage of this program is that it delivers effective smoking cessation services to a diverse population of smokers and has no geographical limitations as opposed to clinic-based smoking cessation programs. Table 1 summarizes the key components of the FREE & CLEAR program.

The FREE & CLEAR cessation specialist counseled the subjects on the behavioral aspects of smoking cessation, worked with the subjects in setting quit dates, made recommendations for adjunct pharmacotherapeutic agents (ie, nicotine replacement therapy and/or Bupropion HCl [Zyban]) and faxed the pharmacotherapy recommendation to the principal investigator. The principal investigator contacted the subjects by telephone, verified the subjects' intent to use cessation pharmacotherapy, and excluded contraindications to use of cessation pharmacotherapies. The subjects subsequently received cessation pharmacotherapies through the study.

TABLE 1
Summary of Study Design and Treatment Specifications

Control Group	Intervention Group FREE & CLEAR
• Self-help smoking cessation materials	• Unlimited access to toll free quit-line for 12 months.
• A letter to personal physician for smoking cessation follow-up	• A personal smoking cessation specialist
	• Five scheduled outbound counseling sessions
	• FREE & CLEAR written program materials
	• Nicotine replacement therapy (NRT) and/or Bupropion HCl (Zyban) as recommended by FREE & CLEAR.

*Control Group.*These subjects received brief physician advice to quit smoking as well as written instructions to follow-up with their respective personal physicians for assistance to quit smoking. In addition, self-help materials for smoking cessation and a local listing of smoking cessation resource centers were given to the subjects.

Statistical Methods

The primary outcome of interest was quit status at 6 months follow-up. Quit status was measured as a point prevalence measure with a minimum duration of abstinence of one month. Secondary outcomes included changes in cigarette consumption and progression through the stages of change continuum at 6 months for nonquitters.

To verify the success of the randomization technique, descriptive characteristics for the intervention and control groups were generated and compared. The data were analyzed using the intent-to-treat and treatment-received approaches. Intent-to-treat analysis is an analysis of effectiveness, ie, the actual effect of the intervention in a world where people and systems do not behave optimally. Thus, an intent- to-treat approach compares subjects based on their original assigned groups, regardless of their adherence to treatment recommendation. On the other hand, the treatment-received analysis is as a measure of efficacy ie, the potential effect of an intervention under optimal circumstance. Thus, poor compliers would be excluded from the group, thereby comparing subjects according to the intervention actually received.[18]

The outcome variables were compared between the intervention and control groups using the Pearson chi-square test, unless the expected cell count for any of the contingency table was less than five, in which case Fisher's exact test was used. For continuous variables, the *t* test was used to compare the means. For the purpose of this study, the reported quit rates assume that subjects lost to follow-up did not proceed with physician consultation or the FREE & CLEAR program and were classified as nonquitters. To assess progression through the stages of change continuum at six months for nonquitters, a score of 1 was assigned for precontemplation, a score of 2 for contemplation, a score of 3 for preparation, and a score of 4 for action/quit. The distribution of these scores at baseline and 6 months follow-up among subjects in the intervention and control groups was plotted using box plot diagrams. Statistical significance was defined as two sided $P < 0.05$ and SPSS software for windows version 10.0.7 (SPSS Inc. Chicago, IL) was used for data analysis.

Results

Population

Six hundred and thirty-nine asbestos workers and retirees attended medical screening at the two study sites (MSSM & UMDNJ-RWJMS) from May 2000 to May 2001. They included members of the Services Employees Union, AFL-CIO Local 74 (school and library employees), Operating Engineers, AFL CIO Local 891(custodian engineers), and AFL CIO Local 94 (firemen) of New York. In addition, Plumbers (Local 24), and Pipefitters (Local 475) of New Jersey, as well as sheet metal workers of Northern New Jersey, New York, South Eastern Pennsylvania, and Western Connecticut (Locals 19, 22, 25, 27, 28, and 38) attended medical screening during the period of the study. Out of the 639 asbestos workers and retirees who attended medical screening at the two study sites, 89 (13.9%) reported being current smokers at the beginning of the study. Fifty-nine of the 89 smokers elected to participate in the study representing a 66.3% participation rate.

Demographic and Smoking Characteristics

Table 2 shows the baseline demographics and smoking characteristics for the intervention and control groups. The intervention group had a higher proportion of Hispanics while the control group had a higher proportion of Asians. The intervention and control groups were otherwise comparable across demographic and smoking characteristics at baseline.

Smoking Cessation Assistance and Quit Status at 6 Months Follow-up

At 6 months of follow-up, 40 of the 59 subjects (68%) were available for telephone interview. The proportion of subjects who were lost to follow-up was comparable between the intervention and control group (Table 3). In the control group, only 21% of the subjects consulted their personal physician for assistance with smoking cessation while 40% of the smokers in the intervention group proceeded with the telephone-

TABLE 2
Demographics and Smoking History at Baseline

	FREE & CLEAR N = 30 (%)	Control N = 29 (%)	*P* Value
Gender			
Male	27 (90.0)	28 (96.6)	0.61[a]
Age (years)			
Mean ± SD	51.5 ± 8.391	52.71 ± 9.552	0.62[b]
Range	40–75	37–73	
Race			
White	22 (73.3)	26 (89.7)	0.03[c]
Hispanic	7 (23.3)	0 (0.0)	
Asian	0 (0.0)	2 (6.9)	
Marital status			
Single	7 (23.3)	6 (20.7)	0.47[c]
Married	16 (53.3)	20 (69.0)	
Divorced/Separated/Widowed	7 (23.3)	3 (10.3)	
Education			
Less than high school	4 (13.3)	1 (3.4)	0.60[c]
High school diploma	17 (56.7)	19 (65.5)	
Some college/college degree	9 (30.0)	9 (31.0)	
Years in asbestos trade			
Mean ± SD	26.5 ± 8.4	28.8 ± 10.5	0.36[b]
Range	11–41	11–54	
Age of smoking initiation (years)			
Mean ± SD	16.80 ± 4.5	16.93 ± 4.2	0.91[b]
Range	10–26	7–25	
Cigarettes/day			
Mean ± SD	22.2 ± 13.02	21.38 ± 9.9	0.79[b]
Range	2–40	2–40	
Nicotine dependence			
≤ 6 (low/moderate)	16 (53.3)	10 (34.5)	0.19[a]
> 7 (high)	14 (46.7)	19 (65.5)	
Stage of change			
Precontemplation	6 (20.0)	3 (10.3)	0.56[c]
Contemplation	9 (30.0)	9 (31.0)	
Preparation	15 (50.0)	17 (58.6)	
Follows through when mind is made up			
Usually not	0 (0)	1 (3.4)	0.58[c]
Some of the time	6 (20.0)	5 (17.2)	
Most of the time	24 (80.0)	23 (79.3)	
Level of self confidence in ability to quit smoking			
Not at all	2 (6.7)	3 (10.3)	0.56[c]
Somewhat	3 (10.0)	4 (13.8)	
Moderately/Quite	22 (73.3)	18 (62.0)	
Very	3 (10.0)	4 (13.8)	

[a] Fischer's Exact Test; [b] *t* test; [c] Pearson's.

based smoking cessation program (FREE & CLEAR; Table 3).

Subjects in the intervention group were almost twice as likely to use adjunct pharmacotherapy (nicotine replacement therapy and/or Bupropion HCl) for smoking cessation compared to the control group (30% versus 17%, respectively). Intent-to-treat analysis revealed a 16.7% quit rate at 6 months for the intervention group compared to 6.9% for the control group ($P = 0.25$). Quit rates based on treatment-received were 33.3% for the intervention group and 6.9% for the control group ($P = 0.05$). The average duration of abstinence was three months and this was comparable between the two groups (Table 3).

There were no significant differences in demographics, smoking characteristics, motivation to quit and barriers to cessation at baseline between the subjects who followed through with FREE & CLEAR (treatment-received group) and those who were randomized to FREE & CLEAR but chose not to follow through with treatment (data not shown).

Barriers to Smoking Cessation

The average cigarette consumption decreased slightly in continuing smokers at 6 months follow-up and the reduction was comparable among continuing smokers in the intervention (↓13.1%) and control (↓10.2%) groups (Table 4). Subjects in the intervention group were less likely to indicate that they preferred to quit without assistance (0% versus 13.8%) and were not ready to quit (3.3% versus 6.9%) compared to the control group. However, subjects in the intervention group were more likely to state that they were too busy to quit (10% versus 6.9%) compared to the control group. It is notable that 3 out of the 14 subjects interviewed in the control group indicated that they did not have a personal physician, and as such, would not have been able to obtain personal physician assistance for smoking cessation (data not shown).

Progression through the Stages of Change

Information on stage of change was available at both the baseline and at 6 months follow-up on 40 subjects. Subjects in the intervention group appeared to have progressed further along the stage of change continuum compared to those in the control group (Fig. 1). As can be seen in the figure, at 6 months of follow-up, a greater proportion of subjects in the intervention compared to the control group obtained higher scores on the stage of change.

Discussion

In a previous study, Osinubi et al.[19] examined smoking behavior in workers attending medical screening for asbestos-related diseases. That study showed that the workers were well aware of the increased risks from smoking and asbestos exposure

TABLE 3
Smoking Status at 6-Month Follow-up

	FREE & CLEAR N = 30 (%)	Control N = 29 (%)	P Value
Available for follow-up at 6 months	20 (66.7)	20 (69)	0.85[c]
Followed up with Free & Clear	12 (40)	N/A	
Smoking cessation pharmacotherapy use			
NRT patch/gum	5 (16.7)	3 (10.3)	
Bupropion HCl (Zyban)	4 (13.3)	1 (3.4)	
Combination	0 (0)	1 (3.4)	
No pharmacotherapy	21 (70)	24 (82.8)	
Total pharmacotherapy use	9 (30)	5 (17.2)	0.36[a]
Quit at 6 month follow-up			
Intent-to-treat analysis	5 (16.7)	2 (6.9)	0.25[a]
Treatment-received analysis	4/12 (33.3)	2/29 (6.9)	0.05[a]
Duration of abstinence (months)			
Mean ± SD	3.65 ± 1.7	3.25 ± 0.4	0.76[b]
Range	(1–5)	(3–3.5)	

[a] Fischer's Exact Test; [b] *t* test; [c] Pearson's.
NRT, nicotine replacement therapy.

TABLE 4
Cigarette Consumption at Baseline and 6 Months Follow-up for NonQuitters

Nonquitters available for follow-up at 6 months	FREE & CLEAR N = 15	Control N = 17[b]
Baseline cigarettes/day		
Mean ± SD	25.9 ± 12.9	20.5 ± 9.1
Range	2–40	2–40
6 Month follow-up (cigarettes/day)		
Mean ± SD	22.5 ± 13.0	18.4 ± 11
Range	2–40	4–40
Mean difference (%)[a]	−3.4 (−13.1%)	−2.1 (−10.2%)

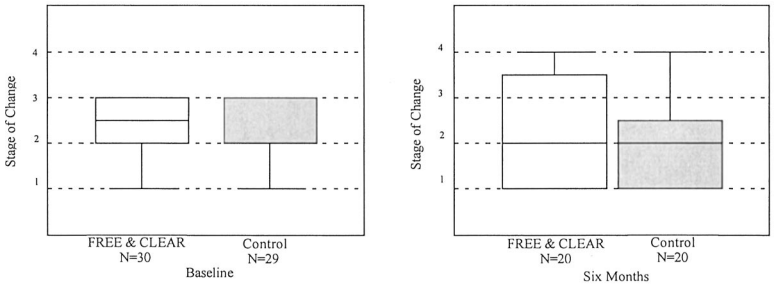
[a] *t* test: $P = 0.58$.
[b] Data missing for one subject.

and the smoking prevalence in their predominantly male asbestos worker population was only 16%,[19] compared with 37% for male blue-collar workers in general.[1] The study also showed that the continuing smokers had made an average of three failed quit attempts, were highly motivated to quit but had difficulty with quitting. The investigators surmised that the continuing smokers would likely require additional assistance (ie, over and above brief physician counseling or advice) to be successful at abstinence.

The goal of this pilot study was to determine the feasibility of incorporating telephone-based smoking cessation treatment into medical screening for asbestos workers. Two thirds (66.3%) of current smokers, in our study population, elected to participate in the study. This finding coupled with data from the prior study by the principal investigator[19] indicates that a majority of asbestos workers who smoke would like additional assistance with smoking cessation. In addition, 68% of the participants were available at 6 months follow-up and this suggests that studies that examine the efficacy of innovative smoking cessation interventions in this population are viable as well.

Our results show that the intervention group was twice as likely to proceed with smoking cessation counseling/assistance, approximately two times more likely to use cessation pharmacotherapies, and was five times more likely to quit smoking at 6 months compared with the control group ($P = 0.05$), that is, based on treatment-received analysis. However, statistical significance was not achieved for the comparison using intent to treat analysis likely because of limited study power (23%). In addition, the continuing smokers in the intervention group progressed further along the stages of change continuum than the control group.

A limitation of this pilot study is the lack of a biomarker to confirm subjects' smoking status. Biochemical verification of smoking status remains a perplexing problem in studies that examine cessation activity given that it is not always practical to have the subjects come back to the study site to provide a urine or saliva sample for cotinine as in the case of this study. Some investigators have tried to overcome this obstacle by obtaining saliva samples through the mail from subjects. A basic limitation of using cotinine



Stages of Change:
4=Action (first 6 months of quitting)
3=Preparation (planning to quit within the next 30 days)
2=Contemplation (planning to quit within the next 6 months)
1=Pre contemplation (not planning to quit in the next 6 months)

Fig. 1. Stage of change continuum: Free and clear intervention compared to control at baseline and six months.

from saliva sent through the mail is that it implies that the saliva sample actually belongs to the subject. This assumption may not necessarily be valid and the accuracy of this method may not differ significantly from subject's self report.

However, Patrick et al.[20] conducted a review and meta-analysis of the validity of self-reported smoking status and concluded that self-reports of smoking are accurate in most studies. In addition, population studies of smoking (eg, the tobacco use supplement of the Current Population Surveys) continue to rely on self-reported smoking status. Based on these facts and the lack of a gold standard for ascertaining long-term abstinence we are willing to accept the self-reported quit status of our study subjects.

Although smoking prevalence is relatively low among asbestos workers who attend medical screening (14% in the present study compared with 37% in male blue-collar workers in general), the adverse effects of smoking are greater among this group of workers and there are opportunities to further decrease smoking prevalence among these workers, using innovative smoking cessation techniques as we have here. This pilot study demonstrates that incorporating such interventions into routine medical screening is indeed feasible and suggests that larger multicenter studies be done to corroborate these findings.

Acknowledgment

The authors acknowledge Ms. Diane Monahan (MSSM) and Mary Lou Mills, RN (UMDNJ-RWJMS) for their excellent work in coordinating the screening activities, as well as cooperation from the staff of the Mount Sinai-Irving J. Selikoff Clinical Center for Occupational Medicine and the Occupational Health Clinic, Environmental and Occupational Health Sciences Institute, UMDNJ-RWJMS. The authors also thank Ms. Cheryl Warren and the staff of Group Health Cooperative of Puget Sound for their collaboration on this project. This study was funded through the Robert Wood Johnson Foundation Grant (# 035288) for building research and educational capacity of the UMDNJ-School of Public Health.

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