Predictors of Smoking Cessation after Coronary Artery Bypass Graft Surgery

Results of a Randomized Trial with 5-Year Follow-up

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■ *Objective:* To test the efficacy of a smoking cessation program for inpatients recovering from coronary artery bypass graft surgery and to identify predictors of cessation.

■ *Design:* Randomized, controlled clinical trial.

■ *Setting:* Postoperative cardiac surgery unit of a large teaching hospital.

■ *Patients:* Patients scheduled for coronary artery bypass surgery by participating surgeons between 1 July 1986 and 1 July 1987 who had smoked 1 or more packs of cigarettes in the 6 months before admission. Of 120 eligible patients, 93 enrolled and 87 were discharged alive. All survivors were followed for at least 1 year; 94% were followed for a median of 5.5 years.

■ *Intervention:* A three-session, nurse-delivered behavior modification program using a videotape and face-to-face counseling was compared to usual care.

■ *Measurements:* Smoking status was assessed six times in the year after surgery and 5.5 years after surgery. Self-reported nonsmoking was validated by saliva cotinine assay 1 and 5.5 years after surgery.

■ *Results:* No statistically significant differences were found between control ($n = 43$) and intervention ($n = 44$) groups at baseline. One and 5.5 years after hospital discharge, validated continuous nonsmoking rates were identical in intervention and control groups (51% at 1 year; 44% at 5.5 years). Multiple logistic regression identified four factors that were independently associated with nonsmoking for 1 year: fewer than 3 previous attempts to quit (odds ratio, 7.4; 95% CI, 1.9 to 29.1); more than 1 week of preoperative nonsmoking (odds ratio, 10.0; CI, 2.0 to 50.2); definite intention to quit smoking (odds ratio, 12.0; CI, 2.6 to 55.1); and no difficulty not smoking in the hospital (odds ratio, 9.6; CI, 1.8 to 52.2). Nonsmoking for 5.5 years was independently associated with two of these factors: fewer than three previous attempts to quit and intention to quit smoking after surgery. Cessation was not related to demographic factors, daily cigarette consumption, disease severity, hospital course, social support, or beliefs and attitudes.

■ *Conclusions:* Even without specific intervention, nearly one half of smokers quit for 5 years after coronary artery bypass surgery. A short inpatient education program did not increase this rate. Future efforts should target the time after discharge and focus on increasing motivation in patients who have repeatedly failed to quit.

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Tobacco smoking is a major risk factor for cardiovascular disease (1). Smokers who quit reduce their coronary heart disease morbidity and mortality rates, even after the onset of clinical disease. Smokers who quit after a myocardial infarction have lower reinfarction rates and longer survival than do those who continue to smoke (2). The relation between smoking and the outcome of coronary artery bypass graft surgery is less well studied, but in one study, smokers who quit after surgery had better survival, fewer attacks of angina, and fewer hospitalizations during a 10-year period (3, 4). Pathologic and angiographic studies show less late saphenous vein graft occlusion in smokers who quit after surgery than in those who do not (5, 6).

Neither the pattern nor predictors of smoking cessation after coronary artery bypass graft surgery have been well studied. The operation may induce smoking cessation, because myocardial infarction and newly diagnosed coronary artery disease do so (2, 7–9). Approximately one third of smokers quit smoking after having a myocardial infarction (2, 9, 10). Patients scheduled for coronary bypass surgery, like patients who have myocardial infarction, face a potentially life-threatening event related to coronary heart disease, one requiring hospitalization for at least 1 week. However, coronary bypass surgery is often elective, whereas myocardial infarction may be an unexpected complication of an undiagnosed condition. Consequently, patients may be less motivated to stop smoking after bypass surgery than they are after myocardial infarction. In a randomized trial of coronary artery bypass surgery, 25% of smokers assigned to surgery stopped smoking in the year after the operation, and smoking rates remained constant for the next 5 years (11). Two newer studies reported higher cessation rates (31% and 55%) (12, 13). None of these studies validated self-reported smoking status at follow-up or identified factors associated with nonsmoking.

Even less is known about the success of smoking interventions in patients having coronary bypass surgery. In-hospital intervention boosts the cessation rate after myocardial infarction (10, 14), but whether it will do so after bypass surgery is unknown. To determine this, we developed a smoking cessation program for inpatients recovering from coronary artery bypass surgery and tested its effectiveness in a randomized, controlled trial. We chose this approach because patients who undergo coronary bypass surgery spend a median of 11 days in the hospital after surgery (15). During this time, they are not permitted to smoke, can be easily reached by an intervention team, and may be highly

motivated to quit. We reasoned that we could take advantage of this period of enforced nonsmoking to teach smokers the skills to remain abstinent after discharge. We also tried to identify factors associated with sustained nonsmoking to guide future intervention efforts.

Methods

Recruitment and Randomization

This trial was conducted in the postoperative cardiac surgery unit at Massachusetts General Hospital. During 1 year ending 1 July 1987, we reviewed the charts of all 672 patients scheduled for coronary artery bypass surgery by six participating surgeons (82% of all such procedures). A research nurse recruited patients who met eligibility criteria: those who had smoked at least 1 pack of cigarettes in the past 6 months, lived in eastern Massachusetts or Rhode Island, spoke English, and were not too ill to participate. We included both current smokers and recent (<6 months) quitters because of the high relapse rates known to follow smoking cessation. Of 672 patients scheduled for the surgery, 152 (23%) were current smokers or had quit within 6 months. Of 120 patients meeting eligibility criteria, 93 (78%) agreed to participate. Reasons for refusals were insufficient time to collect baseline data ($n = 8$), too much stress ($n = 6$), no desire to quit ($n = 6$), or perceived ability to quit without assistance ($n = 3$).

Patients were randomly assigned to control or intervention groups after surgery. Intervention began when the patient was physically able to participate, generally on the fourth day after operation. Four participants were lost before randomization (surgery was canceled for 3 and 1 died), and 89 patients were randomly assigned to control or intervention groups. Two patients, one in each group, died before discharge, when outcome was first assessed. This report is based on the 87 patients (43 controls, 44 patients receiving the intervention) who were discharged alive.

Intervention

The intervention was a smoking cessation and relapse prevention program adapted from the American Lung Association's "In Control" program, which teaches cognitive and behavioral smoking cessation techniques (16). We used edited portions of the videotape and manual to produce a standardized, three-session program delivered by the study nurse to individual patients. Family members were encouraged to attend. Total counseling time was 60 minutes. One week after discharge, the nurse called each participant to offer support and brief counseling. Patients in the control group received usual postoperative care, including brief advice not to smoke as part of a group lecture. Inpatients were not permitted to smoke by hospital policy.

Assessment

Patients completed a baseline data form before surgery. It assessed demographic factors (age, sex, ethnic background, education, and employment status), functional status (17), smoking history (pack-years and daily cigarette consumption), degree of nicotine addiction (18), current symptoms of nicotine withdrawal (19), previous attempts to quit smoking (number of attempts, duration, difficulty, and method), level of social support for nonsmoking, percentage of household members and friends who smoke, knowledge and attitudes about smoking and heart disease (15 items), duration of nonsmoking before surgery, intention to quit after surgery, and confidence in their ability to quit. Charts were reviewed for medical history, severity of heart disease (frequency of angina attacks, number of myocardial infarctions, previous bypass surgery or angioplasty, left ventricular function on angiogram, and number of coronary vessels occluded and bypassed), and hospital course (length of stay and occurrence of 12 complications).

The primary outcome variable was smoking behavior, assessed by self-report and validated by saliva cotinine assay (20). Smoking status was monitored at hospital discharge and 2 weeks and 2, 4, 8, and 12 months later. It was also assessed in September 1992, a median of 5.5 years after discharge (range, 60 to 72 months). At 1 and 5.5 years, self-reported nonsmoking was validated by saliva cotinine assay (20). Samples were obtained by mail, a method previously shown to accurately identify smokers and nonsmokers (21). Individuals who did not provide saliva samples or whose cotinine concentrations were more than 20 ng/mL were considered smokers (22). Death certificate data were reviewed to identify patients lost to follow-up.

Eighty patients (92%) were alive 1 year after discharge, and smoking status was determined in all of them. Seventy patients (80%) were alive at 5.5 years, and smoking status was assessed in 66 (94%). More than 90% of follow-up information was obtained by telephone. If this was not possible, patients were sent a written form.

Other variables assessed at follow-up were nicotine withdrawal symptoms, attitudes and beliefs about smoking, confidence in the ability to quit, health status, and functional status. We also monitored cointerventions, including attendance at a cardiac rehabilitation or smoking cessation program, interim hospitalization, and use of nicotine gum. (Transdermal nicotine was not available during the study period.)

Data Analysis

Two outcome rates were calculated: continuous nonsmoking (no smoking since hospital discharge) and current nonsmoking (no smoking for the past week) (23). Following standard practice, patients lost to follow-up and patients whose reports of nonsmoking were not validated biochemically were counted as smokers when calculating cessation rates (23). We excluded these patients and repeated the calculations. To identify factors associated with smoking cessation, we compared smokers and nonsmokers 1 and 5.5 years after surgery. To minimize misclassification of smoking status in these analyses, we excluded patients lost to follow-up and nonsmokers whose self-report was not validated biochemically.

We compared differences in proportions and means between groups using chi square tests and Student t-tests, respectively. Variables associated with nonsmoking at the $P < 0.05$ level were entered into backward stepwise, multiple logistic regression models, and odds ratios with 95% CIs were calculated. Age, sex, and education level were included in all multivariate models. Significance tests were two-tailed.

Results

Comparison of Groups at Baseline

No statistically significant differences were found between control and intervention groups at study entry or during hospitalization (Appendix Table 1). The typical participant was a middle-aged, white man with a high school education who smoked 1.5 packs each day and had a 58 pack-year smoking history. Participants had made an average of 2.5 attempts to quit smoking, but only 14% had attended a formal program. Although 79% of patients had been told to abstain from cigarettes before surgery, 48% smoked in the week before admission and 15% smoked in the hospital before surgery. In contrast, 38% abstained from tobacco for more than 1 month before admission and 19% did not smoke for more than 3 months. As a group, participants knew that smoking contributed to their heart disease and believed that they would benefit from quitting. They were strongly motivated to quit smoking after surgery and expected some difficulty but were confident of success. They felt strong social support for their cessation efforts. There were no significant differences for these

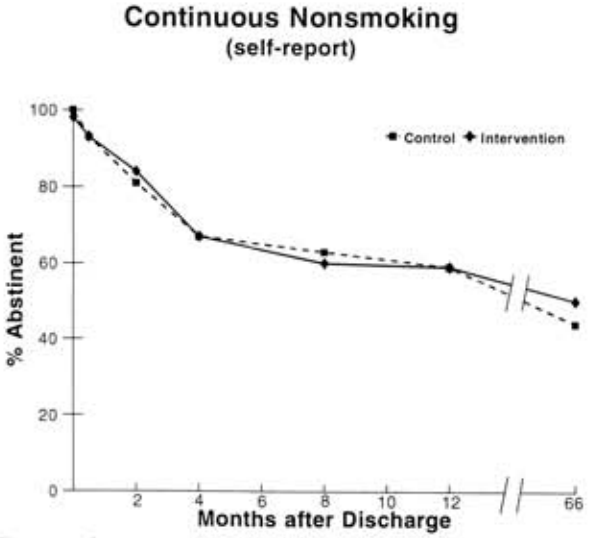

Figure 1. Comparison of control and intervention groups regarding rates of self-reported continuous nonsmoking after hospital discharge. No statistically significant difference was found between groups at any point ($P > 0.62$).

variables (data not shown). Groups did not differ in medical history, extent of coronary heart disease, urgency of surgery, or hospital course (*see* Appendix Table 1).

Intervention patients participated in the smoking cessation program as planned: Forty of 44 attended all three sessions and the others had two sessions. Two weeks after discharge, 40 of 43 intervention patients (95%) recalled seeing the videotape. All 44 received the follow-up counseling call within 2 weeks of discharge.

Smoking Behavior

By self-report, smoking cessation rates were high overall; 59% of survivors did not smoke during the year after hospital discharge, and 47% reported no tobacco use for 5.5 years. Participants in the control and intervention groups did not differ statistically in continuous nonsmoking rates at any time during follow-up (Figure 1). The rate of current nonsmoking (no tobacco in the preceding week) was even higher because it included participants who quit again after relapse. One year after discharge, 70% of smokers reported no smoking in the preceding week. The corresponding figure at 5.5 years was 61%. Current nonsmoking rates were higher in the intervention group after 4 months but not statistically different (Figure 2).

These rates were confirmed by cotinine validation assay. Saliva samples were submitted by 44 of 47 (94%) patients reporting continuous nonsmoking for 1 year, and abstinence was confirmed in 41 samples (87%). The validated continuous nonsmoking rate at 1 year (51%) was identical in control and intervention groups (Figure 3). At 5.5 years, 31 of 33 (94%) self-reported nonsmokers submitted saliva samples, and abstinence was confirmed in all. The validated continuous nonsmoking rate at 5.5 years was 44%, which was identical in control and intervention groups. For current nonsmoking, the cotinine-verified abstinence rate at 1 year was 58%. At 5.5 years, the corresponding verified rate was 54%. Verified current abstinence was slightly better in the intervention group, but differences were not statistically significant (Figure 3).

When analyses were repeated, excluding patients lost to follow-up and those whose self-reported nonsmoking was not verified, differences between control and intervention groups were unchanged. We also determined whether the high cessation rate was attributable to smoking cessation among the subgroup of patients who quit more than 1 month before hospital admission (38% of the sample). Their success might not be attributable to coronary bypass surgery. This was not the case. The 1-year, validated continuous nonsmoking rate of patients who smoked in the month before admission was 49%, compared with 54% for patients who did not smoke for more than 1 month before surgery ($P > 0.10$).

Other Outcomes

We examined other outcomes to determine whether intervention altered patients' attitudes about smoking, degree of nicotine withdrawal symptoms, or confidence in the ability to stop smoking. These measures did not differ at discharge, at 2 weeks, or at 8 weeks. At 1 year, groups did not differ in level of symptoms, functional status, or frequency of potential cointerventions (interim hospitalization, attendance at a smoking cessation or cardiac rehabilitation program, or nicotine gum use). Only three patients attended a smoking cessation program and none of them stopped smoking. No patient used nicotine gum. Mortality rates were similar in control and intervention groups at 1 year (7% compared with 9%) and 5.5 years (19% compared with 18%).

Predictors of Smoking Cessation

Because patients in the control and intervention groups did not differ in baseline characteristics or smoking cessation, we combined groups to identify factors associated with cessation in patients after coronary by-

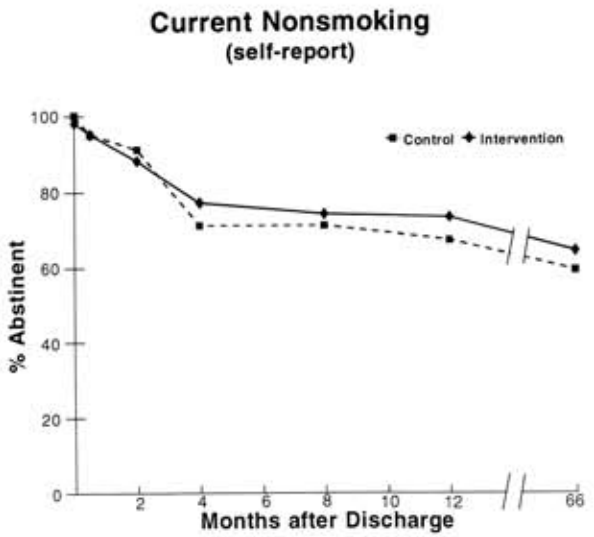

Figure 2. Self-reported current nonsmoking (no cigarettes smoked in the week before follow-up) after hospital discharge. No statistically significant difference in control and intervention groups was found at any time ($P > 0.52$).

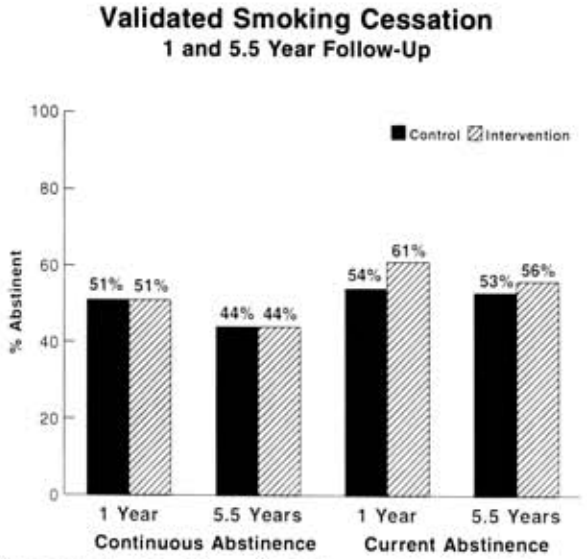

Figure 3. Rates of cotinine-validated nonsmoking 1 and 5.5 years after surgery. No statistically significant differences were found between control and intervention groups ($P > 0.52$). Continuous abstinence refers to no smoking since hospital discharge. Current abstinence refers to no smoking in the past week.

pass surgery. We conducted separate analyses to identify predictors of cessation at 1 and 5.5 years. Table 1 shows factors associated in univariate analysis with sustained nonsmoking for 1 year. Similar factors were associated with cessation for 5.5 years. Variables that were statistically different at the $P < 0.05$ level were entered into stepwise logistic regression models. Table 2 shows factors independently associated with smoking cessation at 1 and 5.5 years. Patients who did not smoke for 1 year after surgery were more likely to have the following characteristics: They had made fewer than three previous attempts to quit, had definite intention to quit after surgery, had abstained from tobacco use for at least 1 week before surgery, and had no difficulty not smoking in the hospital. Two of these factors were also independently associated with nonsmoking for 5.5 years (number of previous attempts to quit and intention to quit after surgery). Another 1-year predictor (no difficulty in not smoking during hospitalization) was of borderline significance at 5.5 years ($P = 0.07$). No significant two-way interactions were found in the models. Smokers and nonsmokers did not differ in demographic factors, medical history, severity of heart disease, hospital course, social support, proportion of friends or family who smoked, or knowledge or attitudes about the importance of smoking cessation.

Discussion

More than one half of smokers who had coronary artery bypass graft surgery quit for 1 year after hospital discharge and nearly one half did not smoke for 5 years. This cessation rate was based on biochemically validated reports of nonsmoking and is conservative because patients lost to follow-up were counted as smokers. Even so, this figure exceeds the rate of smoking cessation observed after myocardial infarction, when approximately one third of patients stop smoking (2, 9, 10). It is double the cessation rate observed in smokers admitted to a coronary care unit (25%) or to the hospital for elective noncardiac surgery (24%) (8, 24). It exceeds cessation rates reported after coronary angiography or angioplasty (12, 25) and the 1-year success rates of outpatient cessation programs (35%) (1). The pattern of relapse after coronary bypass surgery (*see*

Table 1. Factors Associated with Sustained Smoking Cessation 1 Year after Surgery (Univariate Analysis)

Variable	Nonsmokers ($n = 41$)	Smokers ($n = 39$)	P Value
Demographics			
Mean age ± SE, *y*	59 ± 1	58 ± 1	>0.2
Sex (male), *n (%)*	32 (78)	30 (83)	>0.2
Ethnic background (white), *n (%)*	40 (98)	36 (92)	>0.2
Mean years of education ± SE	12.1 ± 0.5	12.6 ± 0.5	>0.2
Smoking history			
Mean pack-years ± SE	38.7 ± 1.4	38.1 ± 1.6	>0.2
Mean cigarettes/day ± SE	27.9 ± 2.3	33.1 ± 3.1	0.18
Addiction score (Fagerstrom scale[18])	5.4 ± 0.3	5.6 ± 0.3	>0.2
<3 previous attempts to quit smoking, *n (%)*	31 (65)	18 (46)	0.010
Previous participation in a smoking cessation program, *n (%)*	3 (7)	9 (23)	0.033
≥1 week abstinence before surgery, *n (%)*	38 (55)	3 (8)	0.007
Medical history and hospital course			
Mean number of vessels with >50% occlusion ± SE	2.9 ± 0.1	2.7 ± 0.1	0.097
Elective admission, *n (%)*	23 (56)	30 (76)	0.045
Mean number of bypasses ± SE	3.8 ± 0.2	3.9 ± 0.2	>0.2
Mean number of postoperative complications ± SE	1.5 ± 0.3	1.4 ± 0.4	>0.2
Mean length of hospital stay ± SE, *d*	23 ± 2.2	22 ± 4.5	>0.2
Plans about smoking after surgery			
Expected no difficulty in not smoking after surgery, *n (%)*	29 (71)	12 (32)	0.006
Very confident in ability to quit, *n (%)*	30 (73)	16 (41)	0.001
Definitely would not be smoking 1 year after surgery, *n (%)*	22 (54)	9 (23)	0.001
Smoking status at discharge			
Definitely did not expect to smoke, *n (%)*	35 (85)	20 (51)	0.001
No difficulty not smoking in hospital, *n (%)*	38 (93)	25 (64)	0.002
No temptation to smoke in hospital, *n (%)*	34 (83)	20 (39)	0.002

Table 2. Factors Independently Associated with Smoking Cessation*

Outcome	Independent Variable	Adjusted Odds Ratio	95% Confidence Interval
1-Year follow-up			
Continuous nonsmoking	<3 previous attempts to quit smoking	7.4	1.9 to 29.2
	Definitely intended to quit after surgery	12.0	2.6 to 55.1
	Did not smoke for >1 week before surgery	10.0	2.0 to 50.2
	No difficulty in not smoking in hospital†	9.6	1.8 to 52.2
Current nonsmoking	<3 previous attempts to quit smoking	13.9	3.2 to 60.5
	Definitely intended to quit after surgery	14.2	3.1 to 64.1
	Type of admission		
	Emergency	11.6	2.1 to 65.3
	Elective	1.0	
5.5-Year follow-up			
Continuous nonsmoking	<3 Previous attempts to quit	5.4	1.3 to 21.4
	Definitely intended to quit after surgery	9.1	1.8 to 45.8
Current nonsmoking	Definitely intended to quit after surgery	5.8	1.1 to 29.5
	Type of admission		
	Emergency	21.3	2.1 to 221.2
	Elective	1.0	

* Stepwise multiple logistic regression analysis, adjusted for age, sex, and education. All factors with a univariate association of $P < 0.05$ were included as candidate independent variables in the logistic models. All factors were assessed before operation, unless noted otherwise.
† Assessed at hospital discharge.

Figure 1) differed from the standard relapse curve (1, 2). Its downward slope was more gradual, indicating that relapse occurred more slowly after surgery.

The high rate of smoking cessation after surgery was not increased by an in-hospital smoking cessation program. This lack of effect does not appear to be explained by methodologic problems in the trial. Patients were randomly assigned to receive treatment, and subsequent analysis showed that randomization balanced baseline and hospital factors between groups. Our cessation program used previously validated behavior modification techniques, and its efficacy was shown in outpatients (16). Use of a videotape permitted the intervention to be delivered in a standardized manner. Patients assigned to treatment received the program as planned. Potential contamination was minimized by having the program delivered by a study nurse rather than by nurses who regularly work in the unit. Cointervention was rare and did not bias results; the few patients who attended another smoking cessation program did not quit smoking. No patient used nicotine replacement therapy. We achieved a high follow-up rate, counted patients lost to follow-up as smokers, and validated self-reports of nonsmoking. Thus, the study design provided a good test of the intervention.

It is possible that repeated telephone calls to participants to determine outcome might have unintentionally boosted smoking cessation. If so, our cessation rate might reflect more than the effect of surgery. This possibility is suggested by previous studies that found less smoking cessation after bypass surgery than we did in our control group (11, 13, 28). However, other studies have reported cessation rates similar to that seen in our controls, suggesting that the effect did not occur (6, 12, 29, 30). Even if outcome assessment did enhance cessation, the effect would have had to be stronger among controls than intervention patients in order to bias the study against detecting an intervention effect.

Our sample size does limit our conclusions about the lack of program effect. The study had 80% power to detect a 30% difference in 1-year continuous cessation, from 50% to 80%. We are, therefore, reasonably certain that our intervention did not have a large effect, one comparable to the 29% difference observed in a recent randomized trial of smoking intervention after myocardial infarction (10). However, we cannot exclude the possibility of a smaller effect that might have been clinically meaningful.

We expected our program to increase smoking cessation rates, but it did not. Educational programs for behavioral change are sometimes advocated in the absence of demonstrated effectiveness on the grounds that education is unlikely to cause harm. However, programs that make intuitive sense may not work in practice and can be costly. The failure of our educational program to improve the cessation rate achieved by surgery alone underscores the importance of rigorous evaluation of educational programs.

We believe that either the strength or timing of our intervention prevented it from being effective. Cardiac surgery alone may be such a strong stimulus to smoking cessation that it outpaces other in-hospital antismoking interventions. Furthermore, transient cognitive impairment has been shown in patients recovering from coronary bypass surgery. Their performance on neuropsychiatric tests done before hospital discharge declines from their preoperative baseline performance (26, 27). Thus, it may have been difficult for patients to learn new skills at the time we taught them. The intervention might have been effective at a later stage in recovery. Figure 1 suggests that smokers need help after discharge, when they are at greatest risk for relapse. In-hospital abstinence may be deceptively easy for smokers. They are removed from their usual smoking cues and may be very motivated to change their behavior. They may not be prepared for the problems that occur after discharge as motivation wanes and temptations reappear. Effective smoking cessation programs for this group probably need to enroll patients during their hos-

pital stay but should focus on the period after hospital discharge.

Our study identified factors associated with long-term smoking cessation after coronary bypass surgery. These factors identify smokers who should be targeted for help after discharge. Patients who quit had less experience in trying to stop smoking but a strong intention to do so. They also complied with routine advice not to smoke before surgery and had less difficulty abstaining during hospitalization. Smokers who had not tried to quit before may have been moved to action by cardiac surgery, as many are after myocardial infarction (9). In contrast, repeated failures to quit smoking, the inability to abstain before surgery, and discomfort during hospital stay may be markers of a recalcitrant smoker. These factors might also reflect a higher level of nicotine dependence.

Few studies of smoking behavior in patients with coronary heart disease have examined psychological variables, such as intention to quit or self-confidence in the ability to do so (self-efficacy). Studies assessing self-efficacy found it to be independently associated with smoking cessation after myocardial infarction (10) or coronary angiography (25). Confidence was strongly associated with cessation in our univariate analysis, but it was replaced in multivariate models with intention to quit, a related psychological factor that was more closely linked to outcome. Studies that did not measure psychological factors often found severity or extent of heart disease to be associated with smoking cessation after myocardial infarction (9, 31) or coronary angiography (12, 25, 32), but we did not. No study of cessation in patients with coronary heart disease, including ours, has reported strong relations between cessation and demographic factors or duration or intensity of the smoker's habit.

Because smoking cessation improves the long-term outcome of coronary artery bypass surgery (4), it is important to note that one half of the smokers who had the procedure resumed smoking within 1 year. Our study suggests an approach to change this. Factors associated with cessation could be identified during hospitalization, permitting patients to be stratified by risk for relapse before discharge. Those at high risk could be targeted for intervention after discharge, with an emphasis on increasing their motivation and ability to quit and on treating nicotine withdrawal. It would be even better to provide smoking cessation programs routinely before, as well as after, coronary bypass surgery. This approach offers additional short-term benefits. Smokers who stop smoking for more than 2 months before elective coronary bypass surgery have fewer postoperative complications and shorter hospital stays (33). The effectiveness and health benefits of smoking cessation interventions before and after coronary artery bypass surgery need further study.

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Appendix Table 1. Baseline and In-Hospital Characteristics of Participants

Variable	Control (n = 43)	Intervention (n = 44)	Total (n = 87)
Demographics			
Mean age ± SD, *y*	59 ± 9	58 ± 8	58 ± 8
Male sex, *n (%)*	33 (77)	34 (77)	67 (77)
White, *n (%)*	40 (93)	43 (98)	83 (95)
Mean years of education ± SD	12.2 ± 2.8	12.1 ± 3.0	12.1 ± 2.9
Employment status (full- or part-time)	25 (58)	26 (59)	51 (59)
Smoking history			
Mean pack-years ± SD	62.4 ± 34.6	53.3 ± 40.6	58.2 ± 37.4
Mean number of cigarettes/day ± SD	32 ± 17	28 ± 17	30 ± 17
Mean addiction score (Fagerstrom scale[18])	5.9 ± 1.7*	5.1 ± 1.9	5.5 ± 1.9
Mean number of quit attempts lasting >24 hours ± SD	2.6 ± 3.1	2.4 ± 3.3	2.5 ± 3.2
Participation in previous smoking cessation program, *n (%)*	7 (16)	5 (11)	12 (14)
Recent smoking behavior			
Smoked in week before admission, *n (%)*	24 (55)	21 (49)	42 (48)
Smoked in hospital before surgery, *n (%)*	5 (12)	8 (18)	13 (15)
Medical history			
Angina pectoris, *n (%)*	36 (84)	37 (86)	73 (85)
Myocardial infarction, *n (%)*	27 (65)	32 (79)	59 (71)
Congestive heart failure, *n (%)*	8 (19)	14 (32)	22 (26)
Previous coronary artery bypass surgery, *n (%)*	4 (9)	5 (11)	9 (10)
Mean number of vessels with >50% occlusion ± SD	2.9 ± 0.6	2.9 ± 0.6	2.9 ± 0.6
Hospital course			
Elective admission, *n (%)*	28 (65)	30 (68)	58 (67)
Mean number of vessels bypassed ± SD	3.9 ± 1.3	3.8 ± 1.0	3.9 ± 1.2
Mean length of hospital stay ± SD, *d*	22 ± 15	22 ± 24	22 ± 20
Mean postoperative complication score ± SD (range, 0–12)	1.3 ± 1.4	1.7 ± 1.7	1.5 ± 1.5

* $P = 0.05$. For all other group differences, $P > 0.05$.

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