

## Promoting Repeat Tobacco Dependence Treatment: Are Relapsed Smokers Interested?

Steven S. Fu, MD; Melissa R. Partin, PhD; Annamay Snyder, MPH;  
Lawrence C. An, MD; David B. Nelson, PhD; Barbara Clothier, MS, MA;  
Sean Nugent, BA; Mark L. Willenbring, MD; and Anne M. Joseph, MD, MPH

**Background:** Promotion of repeat tobacco dependence treatment among relapsed smokers interested in “recycling” (repeat quit attempt) may be a promising approach to increase quit rates.

**Objective:** To report relapsed smokers’ interest in recycling and their treatment preferences.

**Study Design:** Descriptive analysis of a population of relapsed smokers who were randomized to receive a recycling intervention strategy to increase tobacco dependence treatment rates, as part of a randomized controlled trial at 5 Veterans Affairs medical centers.

**Methods:** Individuals prescribed a tobacco dependence medication in 2002 were eligible and were identified from the Department of Veterans Affairs Pharmacy Benefits Management database. Intervention group participants (n = 951) were contacted for a standardized telephone interview approximately 6 months after the prescription fill date to assess smoking status, interest in recycling, and treatment preferences. Bivariate analyses and generalized linear mixed-model regressions were used to describe outcomes.

**Results:** The response rate to the intervention telephone call was 62% (586/951), at which 61% (357/586) of respondents had relapsed. Almost two thirds of relapsed smokers were interested in recycling within 30 days. Of these, 91% wanted behavioral or pharmacologic smoking cessation treatment, and 64% wanted behavioral and pharmacologic treatment. In multivariate analyses, independent predictors of interest in recycling within 30 days included black race, lower smoking level, and greater number of smoking-related medical conditions.

**Conclusion:** Most smokers who attempt to quit but relapse want to quit again right away, and most are interested in receiving behavioral and pharmacologic treatment.

(*Am J Manag Care.* 2006;12:235-243)

The prevalence of tobacco use in the United States cannot be reduced dramatically without helping smokers quit smoking.<sup>1</sup> Successful cessation has immediate health benefits for all smokers and has a major effect on the economic burden of tobacco-related diseases.<sup>2</sup> On the one hand, interest in quitting is high, and 70% of the 46 million smokers in the United States want to quit completely.<sup>3,4</sup> On the other hand, smoking cessation rates for the past 10 to 15 years have remained stable, despite the increased availability of effective behavioral and pharmacologic treatment to help smokers quit smoking. For example, the quit ratio (proportion of ever smokers who have quit), a “dipstick” measure of successful quitting, has remained roughly 50% since 1990.<sup>5</sup> In addition, most quit attempts, in-

cluding those with treatment, do not result in long-term cessation. Depending on the population and intensity of treatment, 65% to 95% of quit attempts end in failure.<sup>6,7</sup> This high rate of relapse illustrates the difficulty and challenges of achieving and sustaining successful smoking cessation.<sup>8-10</sup>

Promoting repeat tobacco dependence treatment among relapsed smokers interested in “recycling” (repeat quit attempt) may be a promising approach to re-engage smokers in the quitting process and to increase cessation rates. Recycling and promotion of repeat treatment recognizes that tobacco dependence is a chronic relapsing disorder and that most smokers will make multiple attempts to quit before successfully achieving long-term abstinence. Because quit attempts aided by behavioral or pharmacologic treatment for tobacco dependence are more likely to be successful than untreated quit attempts,<sup>11</sup> it is important that recycling strategies involve delivery of additional treatment. However, clinicians may fail to make tobacco cessation a high priority because they believe that their patients are uninterested in treatment.<sup>12</sup> Indeed, there is limited information about relapsed smokers’ interest in recycling after a failed quit attempt or about their preferences for various treatment methods.

The Recycling Smokers Through Effective Treatment (RESET) study is a multicenter randomized controlled trial to test the effectiveness of a recycling intervention

From the Section of General Internal Medicine, Center for Chronic Disease Outcomes Research (VA Health Services Research & Development Center of Excellence), Veterans Affairs Medical Center (SSF, MRP, AS, DBN, BC, SN, AMJ) and Department of Internal Medicine, University of Minnesota (SSF, MRP, LCA, AMJ), Minneapolis; and National Institute on Alcohol Abuse and Alcoholism, Rockville, Md (MLW).

This study was funded by grant TRX 01-080 to the Center for Chronic Disease Outcomes Research and by a Research Career Development Award to Dr Fu from the VA Health Services Research & Development Service.

This study was presented in part at the 2004 VA Health Services Research & Development Service National Meeting; March 10, 2004; Washington, DC; and at the 2004 Annual Meeting of the Society of Research on Nicotine and Tobacco; February 19, 2004; Scottsdale, Ariz.

The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

Address correspondence to: Steven S. Fu, MD, Section of General Internal Medicine, Center for Chronic Disease Outcomes Research (VA Health Services Research & Development Center of Excellence), Veterans Affairs Medical Center (152/2E), One Veterans Drive, Minneapolis, MN 55417. E-mail: steven.fu@va.gov.

strategy designed to increase rates of tobacco dependence treatment. The analyses presented herein describe the prevalence and predictors of interest in recycling and smoking cessation treatment preferences among participants in the intervention arm of the RESET study.

## METHODS

### Study Design, Setting, and Participants

Eligible participants were identified from the Department of Veterans Affairs (VA) comprehensive database on VA-issued pharmaceutical prescriptions (Pharmacy Benefits Management database), which includes medication utilization information for every VA patient who has activity at a VA pharmacy. Individuals 19 years or older who received a prescription for nicotine replacement therapy (NRT) (nicotine inhaler, spray, patch, or gum) or for bupropion sustained release (SR) for smoking cessation between February and October 2002 from 1 of 5 participating VA medical centers (Denver, Colo; Salt Lake City, Utah; New Orleans, La; Providence, RI; and Puget Sound, Wash) were eligible for the study. The selected facilities were chosen to represent variation in size, region, and tobacco-dependence prescription protocols (restricted vs unrestricted prescribing privileges for primary care providers). Individuals who did not have a primary care appointment at a participating facility in 2001 or 2002 were excluded, as the intervention was directed in part toward participants' primary care providers. Individuals who did not have complete telephone numbers and addresses in local computerized patient records systems were also excluded because participants in the intervention and control groups were contacted by letter and telephone. The institutional review board at each participating site approved this study.

In the RESET study, randomization occurred at the level of the participant. The number of participants recruited from each site was proportional to its tobacco dependence prescription volume during the recruitment period. Between 245 and 500 participants were recruited from each site; the combined sample size for all facilities was 1900. Using a computer-generated algorithm, the 1900 eligible veterans, stratified by facility, were randomly assigned to (1) a patient telephone call and computerized provider prompt (intervention group) or (2) usual care (control group). The intervention strategy included a telephone call to collect information about smoking status, interest in recycling, and treatment preferences. The information collected was communicated through an electronic progress note to the primary care provider and, if requested by the VA facility, to a representative of the facility's smoking cessation clinic. Progress notes were sent for abstinent patients and for patients interested in

quitting but not for patients who wanted to quit later or not at all. The following 4 types of progress notes were generated for use in the intervention: (1) the patient wanted to quit using NRT, (2) the patient wanted to quit using bupropion SR and reported potential contraindications to its use, (3) the patient wanted to quit using bupropion SR and reported no potential contraindications to its use, or (4) the patient successfully quit.

### Data Collection

Participants randomized to the intervention group were contacted by telephone approximately 6 months after they received a prescription for NRT or for bupropion SR for smoking cessation. Trained telephone interviewers at the coordinating site (Minneapolis VA Medical Center) made 6 attempts to reach each participant. During the intervention telephone call (5-10 minutes), interviewers determined participants' smoking status, interest in making a repeat quit attempt, and treatment preferences (eg, specific behavioral and pharmacologic treatment options). Participants in the control group were not contacted by the study team during the intervention period. All RESET study participants (intervention and control) were contacted 12 months after they received their index prescription for a brief follow-up telephone survey to assess demographic characteristics, which are used as covariates in the analyses herein and as outcome measures for the larger trial.

The objective of the intervention telephone call was to gather information and to assess interest in quitting. We did not attempt to persuade participants to quit smoking. Smoking status was assessed, and for those who were smoking, we assessed the mean number of cigarettes they smoked per day and their interest in making another quit attempt. For those participants interested in trying to quit again, we assessed their preferences for behavioral counseling or for pharmacologic treatment for a repeat quit attempt. For smokers interested in quitting, we also collected information about the medications used in their last quit attempt, adverse effects associated with the last medications used, and quit challenges. When participants were asked about their interest in quitting again, they received no encouragement to quit. For participants who were not interested in quitting, no attempt was made to change their minds. For participants who expressed interest in quitting but stated that they were not interested in the available behavioral or pharmacologic treatment options, we reminded them that their chances of success were much greater if they used counseling and medication therapy and gave them another opportunity to choose a treatment option. For patients who refused this second opportunity, no additional attempts were made to encourage them to choose a treatment option.

## Measures

Intervention participants were asked if they were using medications for smoking cessation. Participants who were using a smoking cessation medication were considered still in treatment, and their smoking status was not assessed. To assess smoking status, all other participants were asked whether they had smoked any cigarettes within the past 7 days. If they reported that they had not smoked any cigarettes, including even a puff, they were considered abstinent. If they reported any smoking in the past 7 days, they were considered to have relapsed to smoking.

The intervention telephone call collected self-reported information about quitting history, use of smoking cessation medications, experience with adverse effects, quit challenges, and current number of cigarettes smoked per day (measure of nicotine dependence). To assess the presence of smoking-related or mental health comorbid conditions, we used participants' clinical diagnosis information in the 2 years before study enrollment from VA outpatient medical records.<sup>13-15</sup> We obtained information about age and sex from VA outpatient medical records and information about race, education, and marital status from the 12-month follow-up survey. In addition, information about the characteristics and practices of the smoking cessation programs (eg, medications available, prescribing policy, and behavioral counseling options) available at each participating facility was provided by the facility's smoking cessation coordinator during a brief telephone survey.

## Outcomes

The primary outcomes for this analysis were participants' interest in recycling within 30 days and their treatment preferences. To assess interest in recycling, participants were asked if they were seriously thinking about quitting smoking within 30 days. To assess treatment preferences, participants were read a brief description of each of the smoking cessation medication options available at their site. The nicotine patch and bupropion SR were available at all 5 sites; 4 of the sites also offered nicotine gum. Because the nicotine inhaler and the nicotine nasal spray were not available at most of the participating sites, they were not offered as treatment options. Participants interested in recycling were asked to choose which option they would be most interested in trying during their next quit attempt. They were allowed to pick more than 1 option if they preferred. Participants were also read a brief description of the behavioral counseling options available at their site and could choose an option if they wished. Three of the 5 sites offered group and individual counseling. One site only offered participants the option of developing a quit plan with their primary

care provider. At another site, participants did not have the option of attending individual counseling sessions (although group sessions were available).

## Statistical Analysis

To assess predictors of interest in recycling within 30 days, we used bivariate tests to compare characteristics of relapsed smokers who were ready to make a repeat quit attempt within 30 days with characteristics of those who were not. To examine independent predictors of recycling within 30 days, we used generalized linear mixed-model regression analyses.<sup>16</sup> To account for clustering of participants within facility, we included VA facility as a random effect. Missing values for race ( $n = 7$ ), number of cigarettes smoked per day ( $n = 9$ ), and education ( $n = 38$ ) were imputed using a standard multiple imputation method.<sup>17-19</sup> This method derives imputed values from a regression model using completed (nonmissing) measures as predictors. In addition, we repeated the regressions without imputations, which produced similar findings. Backward elimination was performed to obtain the final model, using the following criteria: At each step, the largest nonsignificant ( $P > .10$ ) fixed effect was eliminated, which was determined by the type III F test results, as long as no level of the factor in comparison with the reference group was significant at the 5% level.<sup>16,20</sup> Elimination continued until all the remaining fixed effects were significant or until at least 1 comparison with the reference group was significant. The Hosmer-Lemeshow goodness-of-fit test was used to assess the model fit.

To further investigate institutional factors that might influence interest in recycling, we conducted bivariate analyses between the facility random-effects coefficients from the final model and the facility variables from VA administrative sources and the smoking cessation coordinators' survey. We looked for potential trends by assessing Pearson product moment correlation coefficients if the facility variable was continuous and by using Cochran-Armitage trend test statistic values if the facility variable was dichotomous. We only report the facility variables that illustrated at least a marginally significant result ( $P < .10$ ).

---

## RESULTS

### Participant Characteristics

In the RESET study, 951 participants were randomized to receive the recycling intervention strategy (Figure 1). Intervention participants were telephoned on average 6 months (range, 4-8 months) after the fill date of the index prescription, and 586 participants were reached and consented for the telephone interview

(62% response rate). At the intervention telephone call, 61% (357/586) of respondents had relapsed to smoking. However, 18% of respondents were abstinent from smoking, and 21% were in the process of quitting and were receiving smoking cessation treatment.

We compared characteristics of relapsed smokers with those of respondents who were abstinent. There were no significant differences in demographic characteristics, except that relapsed smokers on average were younger (Table 1). Also, the mean time to the intervention telephone call was longer for respondents who had relapsed to smoking. Clinical characteristics differed between abstinent and relapsed smokers. Relapsed smokers were more likely than those abstinent from smoking to have a diagnosis of depression, posttraumatic stress disorder, or substance dependence disorder. Indeed, a substantial proportion of the relapsed smokers in our sample had a history of a mental health condition. For example, about one third of relapsed smokers had a history of depression. Relapse rates did not vary significantly among the participating VA facilities.

Nicotine replacement therapy was overwhelmingly the most commonly prescribed pharmacologic treatment during the index quit attempt. There were few prescriptions for combined pharmacologic treatment with NRT and bupropion SR. Fewer than 5% of respondents reported that they received the index prescription but did not use the medication.

**Interest in Recycling and Treatment Preferences**

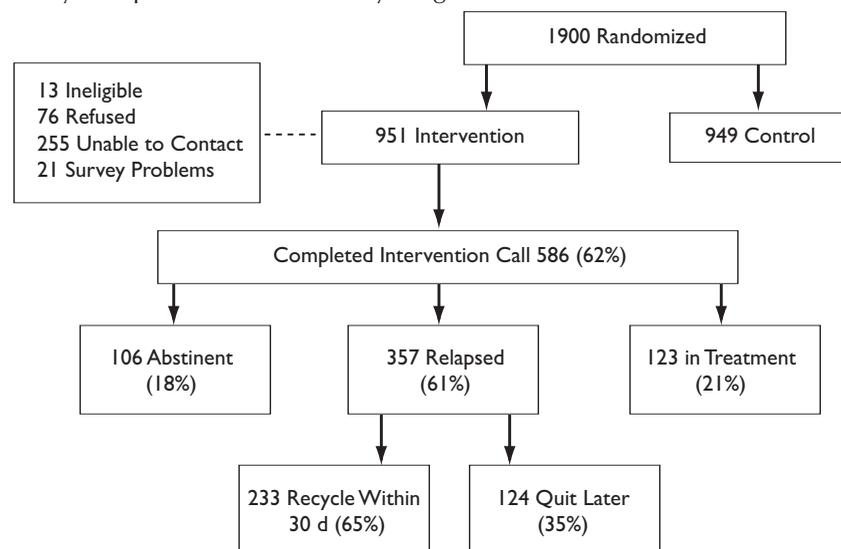
Relapsed smokers were interested in recycling, and 65% wanted to make a repeat quit attempt within 30 days.

Relapsed smokers were also interested in receiving repeat smoking cessation treatment. Among 233 who were interested in recycling within 30 days, 91% wanted pharmacologic treatment by itself or in combination with behavioral treatment, and 64% requested a combination of behavioral and pharmacologic treatment (Figure 2). Twenty-seven percent of smokers interested in recycling within 30 days wanted pharmacologic treatment only, 2% wanted behavioral treatment only, and 7% did not want any treatment. There was almost equal interest in the use of bupropion SR compared with NRT, and a significant proportion of smokers wanted to try NRT in combination with bupropion SR. To assess whether relapsed smokers who were interested in quitting within 30 days were interested in trying the same medication or a different medication from the one used during the index quit attempt in their next quit attempt, we compared smokers' pharmacologic treatment preference with their index prescription. For example, among participants who received any NRT during the index quit attempt, 41% were interested in using NRT again, 35% wanted to try bupropion SR, and 24% wanted to try NRT in combination with bupropion SR. Among participants who received bupropion SR during the index quit attempt, 42% wanted to use bupropion SR again, 38% wanted to try NRT, and 19% wanted to try NRT in combination with bupropion SR. These findings suggest that more than half of relapsed smokers want to try a different treatment in their next quit attempt.

**Predictors of Interest in Recycling**

The high level of interest in recycling within 30 days (n = 357) was consistent across various sociodemographic subgroups in bivariate analyses (Table 2). There were no differences in age or mean time to the intervention telephone call between relapsed smokers who were interested in recycling within 30 days compared with those who were not. We observed no significant associations between mental health conditions and interest in recycling. In fact, individuals with a history of depression, posttraumatic stress disorder, or substance dependence disorder were just as interested in recycling within 30 days as individuals without such a history. However, black subjects were significantly more interested in recycling within 30 days compared with white subjects. Relapsed smokers who smoked more than 30 cigarettes per

**Figure 1.** Recycling Smokers Through Effective Treatment (RESET) Study Sample Interested in Recycling



**Table 1.** Patient Characteristics by Smoking or Treatment Status\*

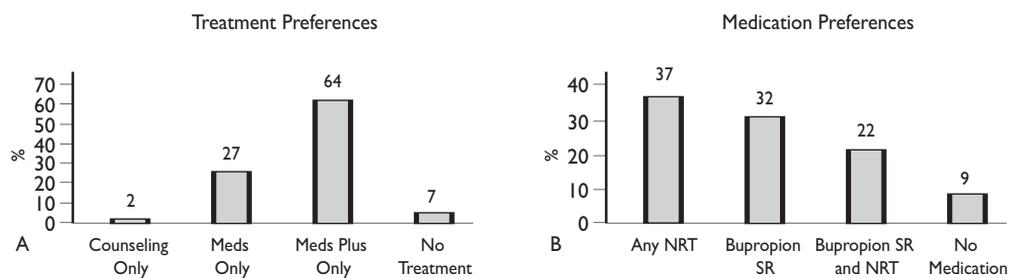
| Characteristic  | Relapsed<br>(n = 357) | Abstinent<br>(n = 106) | In Treatment<br>(n = 123) | Total<br>(N = 586) |
|---|-----------------------|------------------------|---------------------------|--------------------|
| Age, mean ± SD, y <sup>†</sup>                        | 55.9 ± 9.5            | 58.4 ± 9.7             | 57.3 ± 9.1                | 56.7 ± 9.5         |
| Time to intervention call, mean ± SD, mo <sup>†</sup> | 6.2 ± 1.2             | 5.8 ± 1.3              | 6.0 ± 1.2                 | 6.1 ± 1.2          |
| Male sex  | 95                    | 97                     | 93                        | 95                 |
| <b>Race</b>   |                       |                        |                           |                    |
| White   | 75                    | 73                     | 81                        | 76                 |
| Black   | 15                    | 16                     | 11                        | 14                 |
| Other   | 10                    | 11                     | 8                         | 10                 |
| <b>Education</b>                                      |                       |                        |                           |                    |
| High school graduate or less                          | 40                    | 42                     | 38                        | 40                 |
| Some college  | 36                    | 29                     | 41                        | 36                 |
| College graduate                                      | 13                    | 20                     | 14                        | 15                 |
| Missing   | 11                    | 8                      | 7                         | 10                 |
| <b>Marital status</b>                                 |                       |                        |                           |                    |
| Married   | 48                    | 57                     | 53                        | 51                 |
| Previously married                                    | 41                    | 35                     | 41                        | 40                 |
| Never married   | 11                    | 8                      | 6                         | 9                  |
| <b>Index prescription</b>                             |                       |                        |                           |                    |
| Any NRT   | 76                    | 80                     | 71                        | 76                 |
| Bupropion SR  | 15                    | 9                      | 16                        | 14                 |
| Bupropion SR and NRT                                  | 9                     | 10                     | 13                        | 10                 |
| <b>Smoking-related comorbidity</b>                    |                       |                        |                           |                    |
| Cancer  | 3                     | 8                      | 3                         | 4                  |
| Cardiovascular disease                                | 34                    | 39                     | 37                        | 35                 |
| Respiratory disease                                   | 26                    | 26                     | 35                        | 28                 |
| <b>History of mental health comorbidity</b>           |                       |                        |                           |                    |
| Depression <sup>‡</sup>                               | 34                    | 25                     | 44                        | 34                 |
| Posttraumatic stress disorder <sup>‡</sup>            | 21                    | 13                     | 29                        | 22                 |
| Substance dependence disorder <sup>‡</sup>            | 20                    | 12                     | 26                        | 20                 |
| Schizophrenia   | 6                     | 5                      | 9                         | 6                  |
| <b>Department of Veterans Affairs facility</b>        |                       |                        |                           |                    |
| 1   | 14                    | 15                     | 15                        | 14                 |
| 2   | 19                    | 16                     | 10                        | 17                 |
| 3   | 26                    | 27                     | 22                        | 26                 |
| 4   | 23                    | 21                     | 20                        | 22                 |
| 5   | 17                    | 20                     | 33                        | 21                 |

\*Data are given as percentages unless otherwise indicated. NRT indicates nicotine replacement therapy; SR, sustained release.

<sup>†</sup>P < .05 for the comparison between abstinent and relapsed smokers.

<sup>‡</sup>P < .10 for the comparison between abstinent and relapsed smokers.

**Figure 2.** Treatment Preferences (A) and Medication Preferences (B) Among 233 Smokers Interested in Recycling Within 30 Days



Meds indicates medications; NRT, nicotine replacement therapy; and SR, sustained release.

**Table 2.** Bivariate Analysis of Predictors of Interest in Recycling Within 30 Days Among 357 Relapsed Smokers\*

| Characteristic                                    | Interested in Recycling Within 30 d | P     |
|---|-------------------------------------|-------|
| <b>Sex</b>  |                                     | .96   |
| Male  | 65                                  |       |
| Female  | 64                                  |       |
| <b>Race<sup>†</sup></b>                           |                                     | .005  |
| White   | 62                                  |       |
| Black   | 84                                  |       |
| Other   | 61                                  |       |
| <b>Education</b>                                  |                                     | .06   |
| High school graduate or less                      | 66                                  |       |
| Some college                                      | 64                                  |       |
| College graduate                                  | 53                                  |       |
| Missing   | 82                                  |       |
| <b>Marital status</b>                             |                                     | .75   |
| Married   | 64                                  |       |
| Previously married                                | 68                                  |       |
| Never married                                     | 64                                  |       |
| <b>Index prescription</b>                         |                                     | .83   |
| Any NRT   | 66                                  |       |
| Bupropion SR                                      | 62                                  |       |
| Bupropion SR and NRT                              | 67                                  |       |
| <b>Cigarettes smoked per day, No.<sup>‡</sup></b> |                                     | .002  |
| ≤10   | 74                                  |       |
| 11-20   | 66                                  |       |
| 21-30   | 70                                  |       |
| >30   | 38                                  |       |
| <b>History of mental health comorbidity</b>       |                                     |       |
| Depression  |                                     | .24   |
| Yes   | 61                                  |       |
| No  | 67                                  |       |
| Posttraumatic stress disorder                     |                                     | .33   |
| Yes   | 61                                  |       |
| No  | 67                                  |       |
| Substance dependence disorder                     |                                     | .52   |
| Yes   | 68                                  |       |
| No  | 64                                  |       |
| Schizophrenia                                     |                                     | .14   |
| Yes   | 50                                  |       |
| No  | 66                                  |       |
| <b>Smoking-related comorbidity, No.</b>           |                                     | .08   |
| ≤1  | 63                                  |       |
| ≥2  | 74                                  |       |
| <b>Department of Veterans Affairs facility</b>    |                                     | <.001 |
| 1   | 48                                  |       |
| 2   | 82                                  |       |
| 3   | 69                                  |       |
| 4   | 65                                  |       |
| 5   | 55                                  |       |

\*Data are given as percentages unless otherwise indicated. NRT indicates nicotine replacement therapy; SR, sustained release.

<sup>†</sup>Data were missing for 7 subjects.

<sup>‡</sup>Data were missing for 10 subjects.

day were less interested in recycling within 30 days compared with relapsed smokers with lower smoking levels. There was also significant variation in interest in recycling

across participating VA facilities.

Generalized linear mixed-model regression analyses controlling for VA facility were used to examine the independent predictors of interest in recycling within 30 days among 357 relapsed smokers (Table 3). The following factors were not associated with interest in recycling and were eliminated from the regression model: age, sex, education, marital status, time to intervention telephone call, index prescription, diagnosis of diabetes mellitus, and presence of a mental health comorbid condition. Black race (odds ratio, 2.55; 95% confidence interval, 1.07-6.11) and having 2 or more smoking-related conditions (odds ratio, 1.79; 95% confidence interval, 0.99-3.24) were positively associated with interest in recycling, while being a heavy smoker (>30 cigarettes per day) (odds ratio, 0.27; 95% confidence interval, 0.12-0.61) was negatively associated with interest in recycling.

We also conducted bivariate analyses using the facility random-effects coefficient from the final regression model to examine the influence of institutional factors on interest in recycling. The facility random-effects coefficient is the odds ratio of the interest in recycling for a particular site compared with the “average” facility. The interest in recycling was higher in facilities with larger primary care patient volume

( $P = .001$ ) and in facilities that had a formal mental health smoking cessation program ( $P = .047$ ). Interest in recycling was lower in facilities that had a greater num-

ber of restrictions on the prescribing of tobacco dependence medications ( $P = .09$ ).

DISCUSSION

This study provides evidence that recently relapsed smokers are interested in trying to quit smoking again. In this analysis, approximately two thirds of relapsed smokers wanted to make a repeat cessation attempt within 30 days. The high level of interest in recycling was consistent across sociodemographic subgroups, and black subjects were especially interested in recycling. Independent predictors of interest in recycling included black race, lower smoking level, and greater number of smoking-related conditions. Most relapsed smokers were interested in pharmacologic treatment. In addition, there was significant interest in behavioral treatment combined with pharmacologic treatment.

These findings are encouraging because, despite failure, most relapsed smokers are ready to quit in the near future and want smoking cessation treatment. Furthermore, relapsed smokers who struggle with negative effect and depression are interested in recycling. Our results are similar to those of another study,<sup>21</sup> which found that relapsed smokers were interested in trying to quit again. In a cross-sectional survey of relapsed smokers, 98% expressed interest in quitting, and 50% were ready to quit immediately.<sup>21</sup> These findings do not necessarily imply that efforts to encourage repeat cessation attempts are cost-effective. The cost-effectiveness of repeat cessation treatment has not been specifically studied and would depend on the features of the intervention. It is probable that repeat cessation programs would be cost-effective, even if they are more intensive, because smoking cessation interventions in general are cost-effective.<sup>22-26</sup> Moreover, more costly and more intensive smoking cessation interventions yield greater benefit and a lower cost per quality-adjusted life-year saved than less intensive interventions.<sup>23,27</sup> Previous general cost-effec-

tive evaluations likely include substantial proportions of relapsed smokers because most smokers make multiple attempts to quit before achieving long-term abstinence.<sup>28</sup>

Our results are consistent with those of prior studies,<sup>29-31</sup> which demonstrate that black smokers have high levels of motivation to quit and are more interested in quitting than white smokers. A possible explanation for this is that there is a higher proportion of light smokers among black subjects than among white subjects.<sup>29</sup> In this sample, although there were few differences between black subjects and white subjects, black subjects smoked significantly fewer cigarettes per day. However, this would only be a partial explanation because in the regression analysis black race predicted interest in recycling independent of the number of cigarettes smoked per day.

Our findings highlight missed opportunities to help smokers quit because most smoking cessation programs do not systematically contact participants who relapse. Clinicians may fail to instigate repeat treatment because of frustration with smokers' failure to quit.<sup>32,33</sup> Such frustration may result from the failure to recognize tobacco use as a chronic relapsing disorder and from the perception that tobacco dependence treatment has limited effectiveness. Furthermore, the acute care orientation of most healthcare practices is a significant barrier to treating chronic diseases and to addressing preven-

**Table 3.** Final Regression Model for Interest in Recycling Within 30 Days Among 357 Relapsed Smokers

| Characteristic                                  | $\beta$ Level $\pm$ SE | P    | Odds Ratio (95% Confidence Interval) |
|---|------------------------|------|--------------------------------------|
| <b>Fixed Effect</b>                             |                        |      |                                      |
| <b>Race</b>                                     |                        |      |                                      |
| White   |                        |      | Referent                             |
| Black   | 0.9364 $\pm$ 0.4454    | .04  | 2.55 (1.07-6.11)                     |
| Other   | 0.0276 $\pm$ 0.3807    | .94  | 1.03 (0.49-2.17)                     |
| <b>Smoking-related comorbidity, No.</b>         |                        |      |                                      |
| $\leq 1$  |                        |      | Referent                             |
| $\geq 2$  | 0.5825 $\pm$ 0.3018    | .054 | 1.79 (0.99-3.24)                     |
| <b>Cigarettes smoked per day, No.</b>           |                        |      |                                      |
| $\leq 10$                                       |                        |      | Referent                             |
| 11-20   | -0.3088 $\pm$ 0.2779   | .27  | 0.73 (0.43-1.27)                     |
| 21-30   | -0.0790 $\pm$ 0.4044   | .85  | 0.92 (0.42-2.04)                     |
| $>30$   | -1.3242 $\pm$ 0.4259   | .002 | 0.27 (0.12-0.61)                     |
| <b>Random Effect</b>                            |                        |      |                                      |
| <b>Department of Veterans Affairs facility*</b> |                        |      |                                      |
| 1   | -0.5673 $\pm$ 0.3111   | .07  | 0.57 (0.31-1.04)                     |
| 2   | 0.5061 $\pm$ 0.3243    | .12  | 1.66 (0.88-3.13)                     |
| 3   | 0.2182 $\pm$ 0.2889    | .45  | 1.24 (0.71-2.19)                     |
| 4   | 0.0851 $\pm$ 0.2927    | .77  | 1.09 (0.61-1.93)                     |
| 5   | -0.2422 $\pm$ 0.2997   | .42  | 0.78 (0.44-1.41)                     |

\*Reference category is the "average" facility.

tive health concerns.<sup>34-38</sup> Tobacco dependence has been compared with other chronic diseases such as diabetes, hypertension, and asthma; however, models for the treatment of tobacco dependence fail to incorporate principles of chronic disease treatment.<sup>28,39</sup>

The strengths of this study are the significant proportion of black subjects in the sample and our successful identification of relapsed smokers using VA pharmacy databases. The study has several limitations. First, the sample was composed of smokers who received care from the VA, and the results may not be fully generalizable to smokers in the general population. Compared with the general population, veterans who obtain care from the VA are more likely to be older men of lower socioeconomic status, with a lower health-related quality of life due to a greater prevalence of comorbid chronic diseases and mental health conditions.<sup>40,41</sup> Veterans are also more likely to smoke cigarettes and to be heavy smokers.<sup>42</sup> Nonetheless, the study findings are relevant for a large number of veterans who obtain care from the VA and who have dual Medicare or Medical Assistance Program eligibility. In addition, one might speculate that smokers in the general population would be more interested in recycling than smokers who are veterans.

Second, data on interest in recycling and treatment preferences were obtained by self-report and might be subject to social desirability bias. However, this is less likely when information is obtained over the telephone compared with in-person interview.

Third, the response rate for the intervention telephone call was 62%. It is possible that nonrespondent relapsed smokers might differ in their interest in recycling and their treatment preferences.

Fourth, there was variation among the facilities in smoking cessation prescribing policies and availability of behavioral counseling services. Although we controlled for facility in the multivariate analyses, it is possible that these site differences affected smokers' interest in recycling and their treatment preferences. In bivariate analyses, greater primary care patient volume and the presence of a mental health smoking cessation program were associated with greater interest in recycling, while increased restrictions on prescribing of tobacco dependence medications was associated with less interest in recycling. However, results of the bivariate analyses should be interpreted with caution because of the small number of sites.

Fifth, we were not able to examine in regression analyses whether interest in recycling was related to the abstinence duration of the index quit attempt. Abstinence duration would be an indicator of the participants' degree of success.

Sixth, we used information about demographics and clinical diagnoses from the VA's outpatient medical records, and there is limited information available about the accuracy (eg, sensitivity and specificity) of outpatient information. Two studies<sup>43,44</sup> examined the validity of the VA's outpatient medical records and found good reliability for demographic information and high sensitivity and specificity for diagnostic information.

Despite these limitations, relapsed smokers are interested in quitting, and most are ready to recycle right away (within 30 days). Most would like to receive behavioral treatment and tobacco dependence medications that may be different from or more intense than (eg, combination NRT and bupropion SR) what they have already tried. Institutional policies that restrict access to tobacco dependence medications may negatively influence relapsed smokers' interest in recycling and may be an important barrier to patients' quitting smoking. Furthermore, if the goal of helping relapsed smokers quit smoking is to be achieved, research is needed to develop interventions and models of care that will recycle smokers through effective treatment and will increase long-term abstinence.

## REFERENCES

1. Fiore MC, Croyle RT, Curry SJ, et al. Preventing 3 million premature deaths and helping 5 million smokers quit: a national action plan for tobacco cessation. *Am J Public Health*. 2004;94:205-210.
2. US Department of Health and Human Services. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, Ga: Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2000.
3. Centers for Disease Control and Prevention. Cigarette smoking among adults: United States, 2000. *MMWR Morb Mortal Wkly Rep*. 2002;51:642-645.
4. Centers for Disease Control and Prevention. Cigarette smoking among adults: United States, 2002. *MMWR Morb Mortal Wkly Rep*. 2004;53:427-431.
5. Giovino GA. Epidemiology of tobacco use in the United States. *Oncogene*. 2002; 21:7326-7340.
6. Pierce JP, Gilpin EA. A minimum 6-month prolonged abstinence should be required for evaluating smoking cessation trials. *Nicotine Tob Res*. 2003;5:151-153.
7. Yudkin P, Hey K, Roberts S, Welch S, Murphy M, Walton R. Abstinence from smoking eight years after participation in randomized controlled trial of nicotine patch. *BMJ*. 2003;327:28-29.
8. Ockene JK, Emmons KM, Mermelstein RJ, et al. Relapse and maintenance issues for smoking cessation. *Health Psychol*. 2000;19(suppl):17-31.
9. Hughes JR, Keely J, Naud S. Shape of the relapse curve and long-term abstinence among untreated smokers. *Addiction*. 2004;99:29-38.
10. Piasecki TM, Fiore MC, McCarthy DE, Baker TB. Have we lost our way? The need for dynamic formulations of smoking relapse proneness. *Addiction*. 2002;97: 1093-1108.
11. Zhu SH, Melcer T, Sun J, Rosbrook B, Pierce JP. Smoking cessation with and without assistance: a population-based analysis. *Am J Prev Med*. 2000;18:305-311.
12. Block DE, Hutton KH, Johnson KM. Differences in tobacco assessment and intervention practices: a regional snapshot. *Prev Med*. 2000;30:282-287.
13. World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Ninth Revision*. Geneva, Switzerland: World Health Organization; 1977.
14. Lando H, Hennrikus D, McCarthy M, Vessey J. Predictors of quitting in hospitalized smokers. *Nicotine Tob Res*. 2003;5:215-222.
15. US Department of Health and Human Services. *The Health Consequences of Smoking: A Report of the Surgeon General*. Atlanta, Ga: Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2004.
16. McCulloch CE, Searle SR. *Generalized, Linear, and Mixed Models*. New York, NY: John Wiley & Sons Inc; 2001.

17. Little RJA, Rubin DB. *Statistical Analysis With Missing Data*. New York, NY: John Wiley & Sons Inc; 1987.
18. Wolfinger R, O'Connell M. Generalized linear mixed models: a pseudo-likelihood approach. *J Statist Comput Simulation*. 1993;48:233-243.
19. SAS. Cary, NC: SAS Institute Inc; 2002.
20. Neter J, Wasserman W, Kumer M. *Applied Linear Statistical Models*. Boston, Mass: Irwin; 1990.
21. Joseph AM, Rice KL, An LC, Lando H. Recent quitters' interest in recycling and harm reduction. *Nicotine Tob Res*. 2004;6:1075-1077.
22. Cummings SR, Rubin SM, Oster G. The cost-effectiveness of counseling smokers to quit. *JAMA*. 1989;261:75-79.
23. Cromwell J, Bartosch WJ, Fiore MC, Hassleblad V, Baker T. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. *JAMA*. 1997;278:1759-1766.
24. Croghan IT, Offord KP, Evans RW, et al. Cost-effectiveness of treating nicotine dependence: the Mayo Clinic experience. *Mayo Clin Proc*. 1997;72:917-924.
25. Walsey MA, McNagny SE, Phillips VL, Ahluwalia JS. The cost-effectiveness of the nicotine transdermal patch for smoking cessation. *Prev Med*. 1997;26:264-270.
26. Song F, Raftery J, Aveyard P, Hyde C, Barton P, Woolacott N. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Med Decis Making*. 2002;22(suppl):S26-S37.
27. Curry SJ, Grothaus LC, McAfee T, Pabiniak C. Use and cost-effectiveness of smoking cessation services under four insurance plans in a health maintenance organization. *N Engl J Med*. 1998;339:673-679.
28. Fiore MC, Bailey WC, Cohen SJ, et al. *Treating Tobacco Use and Dependence: Clinical Practice Guideline*. Rockville, Md: US Dept of Health and Human Services, Public Health Service; 2000.
29. Pederson LL, Ahluwalia JS, Harris KJ, McGrady GA. Smoking cessation among African Americans: what we know and do not know about interventions and self-quitting. *Prev Med*. 2000;31:23-38.
30. Royce JM, Hymowitz N, Corbett K, Hartwell TD, Orlandi MA; COMMIT Research Group. Smoking cessation factors among African Americans and whites. *Am J Public Health*. 1993;83:220-226.
31. Fiore MC, McCarthy DE, Jackson TC, et al. Integrating smoking cessation treatment into primary care: an effectiveness study. *Prev Med*. 2004;38:412-420.
32. Cummings SR, Stein MJ, Hansen B, Richard RJ, Gerbert B, Coates TJ. Smoking counseling and preventive medicine: a survey of internists in private practice and a health maintenance organization. *Arch Intern Med*. 1989;149:345-349.
33. Thorndike AN, Rigotti NA, Stafford RS, Singer DE. National patterns in the treatment of smokers by physicians. *JAMA*. 1998;279:604-608.
34. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood)*. 2001;20:64-78.
35. Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Jt Comm J Qual Improv*. 2001;27:63-80.
36. Glasgow RE, Orleans CT, Wagner EH. Does the chronic care model serve also as a template for improving prevention? *Milbank Q*. 2001;79:579-612.
37. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, part 2. *JAMA*. 2002;288:1909-1914.
38. Stroebel RJ, Broers JK, Houle SK, Scott CG, Naessens JM. Improving hypertension control: a team approach in a primary care setting. *Jt Comm J Qual Improv*. 2000;26:623-632.
39. McLellan AT, Lewis DC, O'Brien CP, Kleber HD. Drug dependence, a chronic medical illness: implications for treatment, insurance, and outcomes evaluation. *JAMA*. 2000;284:1689-1695.
40. Wilson NJ, Kizer KW. The VA health care system: an unrecognized national safety net. *Health Aff (Millwood)*. 1997;16:200-204.
41. Kazis LE, Miller DR, Clark J, et al. Health-related quality of life in patients served by the Department of Veterans Affairs. *Arch Intern Med*. 1998;158:626-632.
42. Miller DR, Kalman D, Ren XS, Lee AF, Niu Z, Kazis LE. *Health Behaviors of Veterans in the VHA: Tobacco Use: 1999 Large Health Survey of VHA Enrollees*. Washington, DC: Dept of Veterans Affairs, Veterans Health Administration; 2001.
43. Kashner MT. Agreement between administrative files and written medical records: a case of the Department of Veterans Affairs. *Med Care*. 1998;36:1324-1336.
44. Szeto HC, Coleman RK, Gholami P, Hoffman BB, Goldstein MK. Accuracy of computerized outpatient diagnoses in a Veterans Affairs general medicine clinic. *Am J Manag Care*. 2002;8:37-43.