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The effect of training on the use of tobacco-use cessation guidelines in dental settings

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Abstract

Background—An increase in the number of dentists conducting tobacco-use cessation treatment is needed. The authors assessed the effects of high-intensity training (HIT) or low-intensity training (LIT) and reimbursement on general dentists' tobacco-use–related attitudes and treatment behaviors.

Methods—The authors randomly selected 265 dentists in three states and assigned them to one of five groups: HIT workshop groups with and without tobacco-use cessation counseling reimbursement, LIT mailed self-study groups with and without reimbursement or a control group. Outcomes at follow-up were dentists' self-reported tobacco-use–related attitudes and behaviors and patients' reports of dentists' behaviors.

Results—Significantly more dentists in the intervention groups reported having positive attitudes and behaviors at follow-up than did dentists in the control group. Dentists in the HIT groups, however, reported assessing patients' willingness to quit and assisting them with the quitting process significantly more often than did dentists in the LIT groups. Significantly more patients of dentists in the intervention groups who used tobacco reported receiving advice and assistance from their dentists than did patients of dentists in the control group. Adding reimbursement to HIT or LIT conditions did not provide additional intervention effect.

Conclusion—Dentists trained by means of a workshop or self-study program used components of a recommended guideline more frequently and felt more positive toward tobacco-use cessation counseling than did dentists in the control group.

Clinical Implications—Although the workshop training was more successful than the self-study training, the latter's reach among dentists could have a more significant public health impact. The effect of reimbursement needs further study.

Keywords

Tobacco-use cessation; dental team; dental offices

Tobacco use is the leading avoidable cause of illness and death in the United States.[1] Smoking is associated with oral and pharyngeal cancers,[2] adult periodontitis,[3,4] failure of periodontal therapy,[5,6] failure of dental implants,[5] impaired oral wound healing,[7,8] increased risk of oral pain,[9] other oral changes[10] and dental caries.[11] To address this major health risk,

the U.S. Public Health Service published Clinical Practice Guideline: Treating Tobacco Use and Dependance[12] in 2000 and updated it in 2008.[13]

The guideline describes the 5 As, which is the gold standard for tobacco-use cessation counseling. The 5 As involves the following steps: ask about tobacco use, advise to quit, assess willingness to make a quit attempt, assist in quit attempt and arrange follow-up. Although dental office–based tobacco-use cessation interventions are efficacious,[14–16] adoption into practice has been low.[17–21] Lack of training[18,21] and reimbursement[17,21] are reasons dentists have reported for not engaging routinely in patient tobacco-use cessation counseling.

We conducted a study to compare the effects of workshop training (which we considered to be high-intensity training) and mailed self-study training (which we considered to be low-intensity training) with and without reimbursement for counseling on general dentists' tobacco-use–related attitudes and behaviors. We hypothesized that, after 12 months, dentists' self-reported tobacco-use–related attitudes and behaviors and their patients' reports of the dentists' behaviors would be more favorable in all four intervention groups combined and separately compared with a control group of dentists who were not exposed to any study intervention (hypothesis 1); in workshop groups compared with the self-study groups (hypothesis 2); in reimbursement groups compared with no-reimbursement groups (hypothesis 3); and in the workshop and reimbursement group compared with all other groups (hypothesis 4).

METHODS

The University of California, San Francisco's, (UCSF) and Delta Dental of California's institutional review boards approved this study. From 2004 to 2008, we randomly selected dentists who participated in Delta Dental plans serving state employees in California (CA), Pennsylvania (PA) and West Virginia (WV) (N = 265) from a master Delta Dental provider list (N = 2,174). We randomly assigned 20 percent of the dentists on the master list to the control group recruitment pool and the remaining 80 percent to the pool for recruitment and intervention group randomization. Outcomes at 12 months were dentist-reported tobacco-use–related attitudes and behaviors, as well as their patients' reports of dentists' behaviors at target visits.

Sample size

We used a cluster randomization sample size calculation[22] and estimated that 250 practices with an average of 15 responding patients who used tobacco per practice would provide at least a 90 percent power to test our four hypotheses. The three states had varying tobacco-use prevalence (CA, 14 percent; PA, 21 percent; and WV, 27 percent). Owing to these tobacco-use prevalence differences, providers had to have a minimum of 98 patients in CA, 75 in PA and 37 in WV to have an overall average of at least 15 state-employee group members who smoked, since patient follow-up would be based on Delta Dental's records for this group of insured patients. With those minimums, the average number of state-employee–group patients per practice was 192 in CA, 159 in PA and 57 in WV, corresponding with a state-specific average of at least 15 state employee–group patients who

smoked per practice (CA 14 percent × 192 = 26.9, PA 21 percent × 159 = 33.4, and WV 27 percent × 57 = 15.4).

Dentist recruitment and informed consent

Eligible providers had to be Delta Dental–participating dentists in CA, PA or WV who cared for patients in state employee groups; worked at least four days per week for at least five years; and were 30 through 59 years old.

Since Delta Dental had permission from dentists enrolled in their insurance plans to contact them (per the Health Insurance Portability and Accountability Act's requirements), Delta Dental mailed a letter and questionnaire to 435 dentists randomly selected from the control pool asking them to complete a questionnaire at baseline and at 12 months that would assess the preventive services they provided to patients who were at high risk of developing caries, had chronic adult periodontitis or diabetes or who used tobacco. The letter included an explanation of the study's purpose and risk and benefits, as well as a toll-free number to call if there were any questions. It also notified the dentists that return of the questionnaire implied their informed consent to participate in the study. The mailing also included a preaddressed, stamped envelope in which to return the questionnaire to UCSF and a $10 bill as compensation.

Delta Dental also mailed a letter explaining the study and the four intervention groups to 1,739 dentists randomly selected from the intervention pool. The letter included a preaddressed, stamped postcard for interested dentists to send to UCSF, giving permission for an investigator to call and provide more information about the study. After the telephone call, a UCSF staff member sent interested dentists a consent form, the same questionnaire sent to the dentists in the control group; a preaddressed, stamped envelope in which to return the documents to UCSF; and a $10 bill as compensation.

We randomized the dentists who consented to being in the study, stratifying according to state and enrollment year in permuted blocks of varying sizes to one of four training formats. In all four training formats, we emphasized that the 5 As approach to patient counseling was a brief intervention taking three minutes or less. To provide tobacco-use cessation counseling with reimbursement potential, we encouraged the dentists in all of the groups to spend at least 15 minutes enhancing patients' motivation by asking about reasons for quitting and reinforcing them; providing information about nicotine addiction, pharmacotherapy and a quit date; helping solve problems with coping with temptation; providing a self-help booklet; referring to a cessation program; and arranging follow-up.[13]

Study groups

Dentists in the self-study–only group received printed guideline materials,[13] telephone quitline information, a chart reminder and checklist system (consisting of stickers to place on patients' charts to remind the clinician to ask about tobacco use and to document tobacco-use cessation counseling provided during the appointment), and a post-survey test to complete and return to receive two continuing education (CE) credits.

The dentists in the self–study-and-reimbursement group received the same resources as the self-study–only group, as well as criteria for reimbursement, one-page claim forms requiring patients to consent to one five-minute quality assurance telephone call and claim submission procedures. We reimbursed dentists for a maximum of four tobacco-counseling sessions of 15 minutes or more per patient at $50 per session, with a practice cap of $2,000. We determined the $50 reimbursement rate and the practice cap on the basis of feedback from Delta Dental about feasible minimum time criteria for counseling reimbursement, as well as the study's budget considerations. The reimbursement process took three to six weeks. Delta Dental processed the one-page claim forms, recharging the study quarterly for reimbursement for claims paid for tobacco-use cessation counseling.

We provided dentists and staff members in the workshop-only group with eight hours of interactive skills-based training by UCSF investigators that included live lecture and discussion, videos modeling the brief intervention, sample scripts, role-playing exercises, educational materials,[13] telephone quitline information, chart reminder and checklist system, a newsletter and a one-month, in-person postintervention follow-up to discuss their counseling experiences.

Dentists in the workshop and reimbursement group received the same training and resources as did dentists in the workshop-only group, plus the identical reimbursement resources as the dentists in the self-study-and-reimbursement group.

Patient recruitment and informed consent

Eligible patients were those in study dental practices who were insured by Delta Dental and at least 18 years old. At 12 months after dentists completed workshop or self-study training, Delta Dental identified 100 patients per dental practice who received a dental examination or underwent dental prophylaxis in the preceding month. Delta Dental mailed a postcard to these patients (N = 22,085) informing them that they would receive a voluntary, confidential questionnaire about preventive dental care. One week later, Delta Dental mailed patients a consent form with a cover letter; the questionnaire; a preaddressed, stamped envelope addressed to Delta Dental; and a color insert highlighting a $100 incentive drawing among patients within each practice who returned the questionnaire. On receiving the completed patient questionnaires, Delta Dental assigned a study identification number to each patient and dental practice, removed all personal identifiers and sent the questionnaires to UCSF for analysis.

Questionnaires

We included 11 items that assessed tobacco-use–related attitudes and 30 items that assessed behaviors on the dentist baseline questionnaire and on the follow-up questionnaire. (Both questionnaires are available as supplemental data to the online version of this article [found at http://jada.ada.org]).

The patient questionnaire consisted of 22 items with response options of "yes," "no" or "I do not use tobacco." Items assessed patients' tobacco-use statuses, willingness to quit and whether they thought tobacco-use cessation counseling should be offered in dental offices. Nineteen items in the questionnaire asked about specific 5 As behaviors that the patients'

dentists used at their last dental visit. (The patient questionnaire is available as supplemental data to the online version of this article [found at http://jada.ada.org]).

Statistical analysis

Using the Mann-Whitney test or χ^2 test, we compared mean follow-up scores in dentists' attitudes and behaviors and positive change scores from baseline to follow-up among all intervention groups combined and separately compared with the control group (hypothesis 1), workshop groups compared with self-study groups (hypothesis 2) and reimbursement groups compared with noreimbursement groups (hypothesis 3) and workshop and reimbursement groups compared with all other groups (hypothesis 4). We computed dichotomized change as a positive difference between each dentist's answers at follow-up and at baseline. We set the positive change variable as 0 if the change was negative or zero, as 1 if the change was positive and as "missing" if either value was missing. We ran a series of individual logistic regression models for each behavior change and attitude change combination to identify attitude changes that were mediators of positive behavior change. Specifically, for a given behavioral outcome, we ran two separate models for each potential mediator. We ran one model with the significant intervention variable as the only predictor and the second model with the significant intervention variable and a specific attitude variable as predictors. If the significance of the odds ratio from the model with only the intervention predictor became nonsignificant with the addition of a specific attitude variable, we considered the attitude variable to be a complete mediator of the positive behavior change.[23]

We also examined patients' reports of their dental care providers' 5 As behaviors to see if their reports of positive provider behaviors differed among the all five study groups. To account for patient clustering within a practice, we used multivariable generalized estimating equation models with a binomial distribution and log link function to analyze patient data. We computed the odds ratio for comparing two groups controlling for age, sex, race and "thinking dental offices should offer services to help patients stop tobacco use" on the basis of preliminary analyses by using statistical software (SAS Version 9.2, SAS Institute, Cary, N.C).

RESULTS

Our study used a 2 × 2 factorial design of training intensity (low and high) by reimbursement (yes or no). We found no significant interaction effect between type of training and reimbursement in either the dentist or patient data. Therefore, to increase statistical power, we pooled our results for dentists and patients in the workshop and reimbursement group with those for dentists and patients in the workshop-only group, respectively, and did the same for the mailed self-study groups. We present findings for the control, workshop and self-study groups.

Dentists

Dentist participation rates were 18 percent in the intervention groups and 24 percent in the control group. Most dentists were white (80 percent), male (86 percent) and had practiced

dentistry full time for at least 15 years (74 percent); 3 percent were daily cigarette smokers; and 42 percent had prior formal training in intervening with tobacco users. There were no significant baseline differences in dentist characteristics among any of the groups. At follow-up, attrition was 28 percent. There was no evidence of significant attrition differences according to group ($P = .17$) or significant demographic differences between dentists who responded and those who did not. Only 52 claim forms were submitted from 13 practices.

The results of our study supported only hypotheses 1 and 2. Table 1 shows that dentists exposed to any training format had significantly more positive attitudes toward intervening with their patients who used tobacco than did dentists in the control group. Dentists in the workshop group, however, felt significantly better prepared to counsel tobacco users, more confident about being able to assess tobacco use and more knowledgeable about pharmacotherapy than did dentists in the self-study groups. When we compared the attitudes of the dentists in the workshop group separately with those of the dentists in the control group, we found that they were significantly more positive. When we compared the attitudes of dentists in the self-study group separately with those of dentists in the control group, we found that they had only a significantly more positive attitude about tobacco-use cessation counseling's importance to their role as dentists.

Table 1 also shows that compared with dentists in the control group, dentists in any intervention group reported using the 5 As significantly more often. Dentists in the workshop group, however, reported assessing willingness to quit and using 12 of 14 other assisting behaviors targeting patients ready to quit significantly more often than did dentists in the self-study group.

When we compared dentists in the workshop group separately with dentists in the control group, we found that they reported documenting tobacco use, assessing willingness to quit, talking about ways to quit and using all 14 other assisting behaviors significantly more often. Dentists in the self-study group reported asking about tobacco use, talking about ways to quit and using nine of the other assisting behaviors significantly more often.

Table 2 (page 608) shows that compared with dentists in the control group, dentists in any intervention group significantly improved from baseline to follow-up at 12 months in feeling well prepared to intervene, effective in intervening, and confident about knowing how to assess tobacco use and having sufficient knowledge about pharmacotherapy; in assessing willingness to quit; in assisting with quit attempts; and in arranging follow-up.

When compared with dentists in the self-study group, a significantly higher percentage of dentists in the workshop group had positive change scores for assessing and assisting behaviors and for feeling well prepared to intervene, quite effective intervening and confident about having sufficient knowledge about pharmacotherapy.

When we separately compared dentists in the workshop group with those in the control group, we found similar results, as well as an additional positive change score for arranging follow-up. When we separately compared dentists in the self-study group with those in the control group, we found that dentists in the self-study group improved significantly only in

feeling well prepared to intervene, in feeling confident about having sufficient knowledge about pharmacotherapy and in arranging follow-up.

Table 3[23] (page 609) shows that for the behavior "assess willingness to make a quit attempt," feeling well prepared to intervene and feeling effective were significant positive change mediators in dentists in any intervention group compared with those in the control group and in the workshop group compared with those in the self-study group. For the behavior "recommending nicotine replacement," the significant positive change mediators in dentists in the any-intervention group compared with those in the control group were feeling well prepared to intervene, feeling effective and feeling they have sufficient knowledge about pharmacotherapy, whereas the positive change mediator for the same behavior in the workshop group compared with the self-study group was feeling they have sufficient knowledge about pharmacotherapy.

Patients

The patient participation rate was 38 percent. Most were white (81 percent), female (65 percent) and believed dental offices should offer tobacco-use cessation services (62 percent). The mean age of the patients was 50 years; 8.5 percent were tobacco users, and 4.0 percent were willing to quit using tobacco. There were no significant differences in patients' characteristics among study groups. Based on Delta Dental's records, we found no significant differences in patients' sexes and ages between those who responded and those who did not, according to group in a randomly selected subsample of 200 nonrespondents.

Overall, 21 percent of patients recalled being asked about tobacco use (data not shown). Among tobacco users (N = 720), 36 percent reported being advised to quit, 29 percent recalled talking about dental problems associated with their tobacco use; 13 percent recalled being asked if they would be willing to try to quit; less than 10 percent reported being assisted with quitting and 3 percent recalled any follow-up being arranged (Table 4, pages 610 and 611).

Table 4 also shows the odds of having a positive response to a behavior question adjusted for the patient's age, race and ethnicity, sex and response to the attitude question "Do you think dental offices should offer tobacco cessation services?" Patients who used tobacco whose dentists were in the self-study or workshop groups were significantly more likely to report being "advised to quit" than were patients whose dentists were in the control group when compared together or separately. Moreover, patients of dentists in the workshop group were significantly more likely to report being referred to a community-based cessation program to help them stop using tobacco than were similar patients of dentists in the control group. Using similar multivariable generalized estimating equation models, we found no significant differences between patients' report of dentists' behavior in practices of dentists in the workshop group and those of dentists in the self-study group.

DISCUSSION

Although dentists who received training reported having significantly more positive attitudes and behaviors related to tobacco-use cessation counseling than did dentists in the

control group, positive change scores in dentists' attitudes and behaviors were significantly better in the workshop group than in the self-study group. Dentists in the workshop group reported using such behaviors as assessing willingness to quit, helping set a quit date, recommending nicotine replacement therapy, providing self-help guides and referring to external and internal cessation programs significantly more often.

Positive change scores in dentists' attitudes of feeling well prepared to intervene, effective intervening and knowledgeable about pharmacotherapy were significantly higher in the workshop group than in the self-study group and the control group when compared separately. This finding is important because these attitudes significantly mediated positive behavior change among dentists in the workshop group.

Nevertheless, at the follow-up, dentists in the self-study group reported that tobacco-use cessation counseling was important to the dentist's role significantly more often than did dentists in the control group, and they performed cessation counseling significantly more often. This finding was corroborated by patients who used tobacco whose dentists were in the self-study and workshop groups. These patients reported being advised to stop tobacco use significantly more often than did similar patients of dentists in the control group. We did not find these results to be surprising, because face-to-face interactive educational outreach with the intent of changing a provider's behavior has been shown to be effective.[24–27] Our findings support workshop-based methods as the most effective means of effecting positive behavior change. In our study, the workshop training led to a higher level of attitude and behavior change that may be required to ensure adoption of the 5 As into routine dental care. We suggest incorporating skills-based tobacco-use cessation workshop training into dental professional educational curricula and CE programs for dental professionals.

Our findings also suggest that mailed self-study materials have the potential to increase awareness about the importance of tobacco-use cessation counseling among dentists and may promote the use of tobacco-use cessation counseling in the dental setting, but to a more limited degree compared with workshop training. The potential reach of such a mailing to dental professionals also could have a significant public health impact.

Adding the opportunity for reimbursement to the workshop or self-study conditions made no difference in dentists' attitudes or counseling behaviors. Caution should be exercised in interpreting this finding because the low claim form submission rate compromised this result's internal validity and may be explained by reimbursement level, the dentists' need to obtain patients' permission for a quality assurance telephone call on claim forms or the dentists' unwillingness to charge for their time when not per-forming a technical service. The total amount of reimbursement for counseling ($200 per patient for a maximum of four 15-minute sessions) was constrained by the study's budget considerations. We determined that $50 for a 15-minute counseling session was sufficient on the basis of a rate of $200 per hour, since all reimbursement training formats emphasized that the actual cessation counseling could be done by a trained staff member (for example, the dental hygienist), whose time was less costly compared with that of the dentist and could generate additional income for the practice. Further research is needed to explore why more dentists in the reimbursement group did not submit claim forms.

More than one-half of the patients agreed that dental offices should offer tobacco-use cessation counseling. In contrast, fear of offending patients is among the reasons cited by dentists for not providing cessation counseling.[20,21] On the basis of our findings and those of others,[4,21,28–30] there appears to be a disconnect between patients' and dentists' perceptions related to acceptance of tobacco-use cessation counseling in the dental office.

We also found a discrepancy between patients' reports of their dentists' use of tobacco-use–related behaviors and dentists' self-report of their own behavior. Only 21 percent of study patients reported that their dentist asked about tobacco use and only 36 percent of tobacco users said they were advised to quit. In contrast, more than 70 percent of the dentists reported they "often or almost always" asked patients about tobacco use and advised users to quit. Other investigators have reported that providers' self-reports often overestimated performance of tobacco-use cessation counseling.[31] They and other investigators speculate that providers' self-reports may be influenced by the Hawthorne effect, because they know that they are study participants.[31,32]

Measuring patient-reported outcomes and behaviors as close to the appointment as possible has been recommended.[33] In one study comparing the use of immediate patient surveys after the health care appointment with delayed telephone follow-up surveys as methods of measuring patients' reports of providers' use of tobacco-control activities,[32] investigators found that delaying data collection by one to six months appeared to promote patients' overestimations of providers' tobacco-use cessation counseling behaviors. We decided to assess dentists' behaviors by using a mailed patient survey within one month of the appointment to avoid depending on dental practice staff members to distribute and collect immediate patient surveys after the appointment but before leaving the dental office. Doing so would reduce the risk of patient selection bias or even falsification of data; reduce social desirability bias risk, which is greater for telephone surveys than it is for written or mailed surveys[34,35]; and reduce the need to conduct expensive chart audits, which may underestimate provider performance because tobacco-use cessation counseling often is not documented.[36]

Limitations

The generalizability of our findings is limited because we conducted our study in only three states, which are not representative of all states, and because dentist and patient participation rates were modest. Moreover, we included in the study only dentists who participated in Delta Dental plans serving state employees, and they may not be representative of all dentists nationally or of dentists in the three states. In addition, they may have been more motivated to engage in cessation counseling than were those who declined to participate. Lack of systematic assessment of the effect of the training on patient cessation rates is another limitation.

CONCLUSION

Although self-study materials are useful for increasing dentists' awareness of their roles in tobacco-use cessation, skills-based workshop training may be needed to promote the significant behavior changes needed to integrate the 5 As into routine dental care. The reach

of dental professionals who promote tobacco-use cessation could have a significant public health impact and warrants further study.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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ABBREVIATION KEY

5 As	Ask, Advise, Assess, Assist and Arrange
CA	California
CE	Continuing education
HIT	High-intensity training
LIT	Low-intensity training
PA	Pennsylvania
UCSF	University of California, San Francisco
WV	West Virginia

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TABLE 1

Dentists' tobacco-use cessation–related attitudes and behavior scores at 12 months, according to group.

ATTITUDE OR BEHAVIOR	GROUP					*P* VALUE* (WORKSHOP VERSUS SELF-STUDY)
	Control (n = 66), Mean (SD†)	Any Training (n = 199), Mean (SD)	*P* Value (Any Training Versus Control)	Self-Study (n = 100), Mean (SD)	Workshop (n = 99), Mean (SD)	
Dentists' Self-reported Attitudes‡ Related to Intervening With Tobacco-Using Patients						
I feel it is important to intervene with tobacco users	3.8 (0.9)	4.3 (0.8)	< .01	4.2 (0.9)§	4.4 (0.8)¶	.21
Feel well-prepared to intervene	3.2 (1.0)	3.7 (1.1)	< .01	3.4 (1.1)	4.0 (1.0)¶	< .01
Feel effective intervening	2.6 (1.1)	3.0 (1.2)	.02	2.9 (1.2)	3.2 (1.1)¶	.16
Feel I know how to assess tobacco use	3.8 (1.0)	4.2 (0.9)	< .01	3.9 (1.0)	4.4 (0.8)¶	< .01
Feel I have sufficient knowledge of the appropriate pharmaceutical products to intervene with patients about their tobacco use	2.6 (1.1)	3.4 (1.3)	< .01	3.0 (1.2)	3.8 (1.1)¶	< .01
Dentists' Self-reported Behavior# Related to the 5 As**						
Ask about tobacco use	2.9 (0.9)	3.2 (0.8)	.03	3.2 (0.8)††	3.2 (0.8)	.93
Document patient tobacco use	3.0 (1.0)	3.4 (0.8)	< .01	3.3 (0.9)	3.6 (0.8)¶	.91
Advise to quit	3.3 (0.9)	3.5 (0.7)	.23	3.5 (0.7)	3.5 (0.7)	.59
Point out patients' tobacco-use–related dental problems	3.2 (0.9)	3.4 (0.8)	.27	3.4 (0.7)	3.4 (0.8)	.06
Assess willingness to make quit attempt	1.9 (0.8)	2.3 (1.0)	< .01	2.1 (1.0)	2.5 (0.9)¶	.01
Assist in quit attempt (counseling about ways to quit or reduce tobacco use)	2.2 (1.0)	2.9 (0.9)	< .01	2.8 (0.9)¶	3.0 (0.9)¶	.29
Arrange follow-up	1.2 (0.4)	1.6 (0.8)	< .01	1.5 (0.8)	1.8 (0.9)	< .06
Other Assist Behaviors Targeting Patients Ready to Quit						
Ask about reasons for quitting	2.3 (1.0)	2.8 (0.9)	< .01	2.7 (0.9)‡‡	3.0 (1.0)¶	.11
Ask about previous quit attempts	1.7 (0.8)	2.3 (1.0)	< .01	2.1 (1.0)§§	2.6 (1.0)¶	< .01
Suggest ways to cope with temptation to use	1.7 (0.8)	2.2 (1.0)	< .01	2.0 (1.0)	2.5 (1.0)¶	< .01
Suggest telling family and friends for social support	1.9 (1.0)	2.4 (1.1)	< .01	2.1 (1.1)	2.7 (1.0)¶	< .01
Help set a quit date	1.2 (0.6)	1.8 (1.0)	< .01	1.6 (0.9)¶	2.1 (1.0)¶	< .01

ATTITUDE OR BEHAVIOR	GROUP					*P* VALUE* (WORKSHOP VERSUS SELF-STUDY)
	Control (n = 66), Mean (SD†)	Any Training (n = 199), Mean (SD)	*P* Value (Any Training Versus Control)	Self-Study (n = 100), Mean (SD)	Workshop (n = 99), Mean (SD)	
Assess for depressive symptoms	1.2 (0.4)	1.6 (0.9)	< .01	1.4 (0.6)§	1.8 (1.0)¶	.02
Assess nicotine dependence level	1.5 (0.7)	2.0 (1.1)	< .01	1.6 (0.9)	2.4 (1.1)¶	< .01
Assess patterns of use	1.8 (0.9)	2.2 (1.0)	.01	2.1 (1.0)	2.4 (1.0)¶	.05
Recommend nicotine replacement therapy	2.2 (1.0)	2.9 (1.0)	< .01	2.6 (1.0)§	3.1 (0.9)¶	< .01
Prescribe bupropion (Zyban, GlaxoSmithKline, London)	1.2 (0.5)	1.5 (0.9)	.78	1.4 (0.8)‡‡	1.5 (0.9)§	.78
Offer self-help guide	2.1 (1.0)	2.7 (1.1)	.02	2.5 (1.1)‡‡	2.9 (1.0)¶	.02
Refer to a community-based cessation program	1.4 (0.6)	1.9 (1.0)	< .01	1.7 (0.9)§§	2.2 (1.1)¶	.01
Refer to telephone quitline	1.5 (0.7)	2.3 (1.1)	< .01	1.9 (1.1)	2.8 (0.9)¶	< .01
Refer to in-office program	1.2 (0.4)	1.7 (0.9)	< .01	1.5 (0.8)¶	2.0 (1.0)¶	< .01

*Mann-Whitney test.

†SD: Standard deviation.

‡Attitude was scored on a five-point scale on which 1 = very unimportant and 5 = very important on which 1 = strongly disagree and 5 = strongly agree.

§*P* = .02 compared with the control group.

¶*P* ≤ .01 compared with the control group.

#Behavior was scored on a four-point scale of how often dentists used the behavior on which 1 = almost never and 4 = almost always.

**5 As: Ask, Advise, Assess, Assist and Arrange.

††*P* = .05 compared with the control group.

‡‡*P* = .03 compared with the control group.

§§*P* = .04 compared with the control group.

TABLE 2

Percentage of positive change in dentists' tobacco-use cessation counseling–related attitude and behavior scores from baseline to 12 months, according to group.

ATTITUDE OR BEHAVIOR	GROUP					*P* VALUE* (WORKSHOP VERSUS SELF-STUDY)
	Control (n = 66), %	Any Training (n = 199), %	*P* Value (Any Training Versus Control)	Workshop (n = 99), %	Self-Study (n = 100), %	
Dentists' Self-reported Attitudes‡ Related to Intervening With Tobacco-Using Patients						
Feel it is important to intervene with tobacco users	27	31	.13	30	32	.84
Feel well-prepared to intervene	26	42	< .01	48§	37¶	.01
Feel effective intervening	29	38	.01	42§	33	.02
Feel I know how to assess for tobacco use	29	37	.01	40§	34	.08
Feel I have sufficient knowledge of pharmacotherapy	29	49	< .01	55§	43§	< .01
Dentists' Self-reported Behavior# Related to the 5 As**						
Ask about tobacco use	23	17	.66	16	18	.96
Document patient tobacco use	21	20	.71	20	19	.46
Advise to quit	26	20	.61	22	17	.18
Point out patients' tobacco-use–related dental problems	23	22	.59	22	22	.63
Assess willingness to make a quit attempt	23	33	.02	39§	27	< .01
Assist in quit attempt (counseling about ways to quit or reduce tobacco use)	26	38	< .01	41§	35	.05
Arrange follow-up	6	25	.01	27§	23§	.17

*Mann-Whitney test.

†Percentage positive change from baseline to 12 months.

‡Attitude was scored on a five-point scale on which 1 = very unimportant and 5 = very important on which 1 = strongly disagree and 5 = strongly agree.

§$P \leq .01$ compared with the control group.

¶$P \leq .02$ compared with the control group.

#Behavior was scored on a four-point scale of how often they used the behavior on which 1 = almost never and 4 = almost always.

** 5 As: Ask, Advise, Assess, Assist and Arrange.

TABLE 3

Mediators of positive behavior change in dentists in intervention training groups based on logistic regression models of binary behavior changes adjusted for attitude changes.

INDEPENDENT VARIABLE (INTERVENTION)	DEPENDENT VARIABLE (BEHAVIORAL OUTCOME)	INDEPENDENT MEDIATING VARIABLE (ATTITUDE)	INTERVENTION EFFECT,* UNADJUSTED OR† (95% CI‡)	INTERVENTION EFFECT,§ ADJUSTED OR (95% CI)	MEDIATING VARIABLE (ATTITUDE),¶ OR (95 % CI)
Any Intervention Versus the Control Group	Assess willingness to make a quit attempt	Feeling well prepared	2.3 (1.2–4.6)	1.8 (0.87–3.7)	2.3 (1.2–4.4)
		Feeling effective	2.3 (1.2–4.6)	1.9 (0.93–3.9)	2.7 (1.5–5.0)
	Assist in quit attempt (counseling about ways to quit or reduce tobacco use)	Feeling well prepared	2.7 (1.4–5.3)	2.0 (0.95–4.0)	3.8 (2.0–7.3)
	Recommending nicotine replacement	Feeling well prepared	2.4 (1.2–4.7)	1.8 (0.9–3.7)	2.1 (1.1–4.0)
		Feeling effective	2.4 (1.2–4.7)	2.0 (0.98–3.9)	2.1 (1.2–3.9)
		Feeling they have sufficient knowledge about pharmacotherapy	2.4 (1.2–4.7)	1.8 (0.85–3.6)	2.5 (1.3–5.0)
	Encouraging to tell family and friends for social support	Feeling they know how to assess tobacco use	2.4 (1.2–4.6)	1.9 (0.93–3.8)	2.6 (1.4–4.7)
		Feeling they have sufficient knowledge about pharmacotherapy	2.4 (1.2–4.6)	1.7 (0.83–3.6)	2.8 (1.4–5.5)
Workshop Versus Self-Study	Assess willingness to make a quit attempt	Feeling well prepared	2.6 (1.3–5.2)	2.0 (0.9–4.0)	3.0 (1.4–6.6)
		Feeling effective	2.6 (1.3–5.2)	2.0 (0.9–4.0)	3.5 (1.7–7.4)
	Providing coping skills training	Feeling effective	2.8 (1.4–5.6)	2.0 (0.95–4.2)	3.2 (1.5–6.8)
	Offering an in-office cessation program	Feeling they have sufficient knowledge about pharmacotherapy	2.6 (1.3–5.2)	2.2 (1.0–4.6)	3.6 (1.3–9.7)
	Recommending nicotine replacement therapy	Feeling they have sufficient knowledge about pharmacotherapy	2.3 (1.1–4.6)	1.7 (0.79–3.6)	4.0 (1.7–9.8)
	Providing self-help quit materials	Feeling they have sufficient knowledge about pharmacotherapy	2.7 (1.3–5.7)	2.3 (1.0–5.3)	3.5 (1.5–8.1)

*Odds ratios from logistic regression models of behavior changes unadjusted for attitude changes: logit (behavioral outcome) = intervention.

†OR: Odds ratio.

‡CI: Confidence interval.

[§] ORs from logistic regression models of behavior changes adjusted for attitude changes: logit (behavioral outcome) = mediating attitude + intervention.

[¶] The intervention variable lost significance with the addition of the attitude to the model. Therefore, we identified the attitude as a complete mediator of the behavioral change.[23]

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TABLE 4

Patients who used tobacco responding "yes" when asked on a survey[*] if their dental providers used specific 5 As[†]–related behaviors at their last dental visit, overall and according to group.

DENTIST BEHAVIOR OUTCOME, GROUP	PATIENTS ANSWERING "YES" OVERALL, % (NO./TOTAL)[‡]	PATIENTS ANSWERING "YES" IN EACH GROUP, % (NO./TOTAL)[‡]	ODDS RATIO (95% CONFIDENCE INTERVAL)[§]	*P* VALUE	TYPE 3 *P* VALUE
Talked About My Dental Problems From Using Tobacco	29 (184/637)				
Control		28 (49/175)	1.00		.68
Self-study		32 (73/229)	1.2 (0.73–2.0)	.47	
Workshop		27 (62/233)	1.0 (0.61–1.6)	.99	
Advised to Quit	36 (226/637)				
Control		27 (47/175)	1.00		.01
Self-study		42 (96/230)	2.0 (1.3–2.7)	.01	
Workshop		36 (83/232)	1.7 (1.0–2.7)	.04	
Assessed Willingness to Make a Quit Attempt	13 (84/635)				
Control		9 (15/175)	1.00		.06
Self-study		15 (34/229)	1.8 (0.96–3.5)	.07	
Workshop		15 (35/231)	2.1 (1.1–4.3)	.04	
Gave Written Materials on How to Quit Using Tobacco	7 (44/635)				
Control		6 (10/174)	1.00		.48
Self-study		6 (14/230)	1.0 (0.44–2.4)	.94	
Workshop		9 (20/231)	1.6 (0.69–3.9)	.26	
Referred to a Community-based Cessation Program	4 (24/635)				
Control		1 (2/174)	1.00		.054
Self-study		5 (11/230)	4.1 (0.97–19.4)	.07	
Workshop		5 (11/231)	4.6 (0.98–21.0)	.05	
Helped Set a Quit Date	2 (12/635)				
Control		2 (3/174)	1.00		.36
Self-study		3 (7/230)	1.7 (0.43–7.0)	.43	

DENTIST BEHAVIOR OUTCOME, GROUP	PATIENTS ANSWERING "YES" OVERALL, % (NO./ TOTAL)‡	PATIENTS ANSWERING "YES" IN EACH GROUP, % (NO./TOTAL)‡	ODDS RATIO (95% CONFIDENCE INTERVAL)§	*P* VALUE	TYPE 3 *P* VALUE
Workshop		1 (2/231)	0.49 (0.9–2.0)	.44	
Suggest Ways to Deal With Nicotine Withdrawal and Temptation to Use Tobacco	5 (30/635)				
Control		2 (4/174)	1.00		.10
Self-study		7 (15/230)	2.7 (0.99-7.2)	.05	
Workshop		5 (11/231)	1.8 (0.64-5.1)	.26	
Suggested Nicotine Replacement therapy or Prescribed Bupropion (Zyban, GlaxoSmithKline, London)	7 (45/636)				
Control		5 (8/174)	1.00		.19
Self-study		10 (24/231)	2.2 (0.96-4.8)	.06	
Workshop		6 (13/231)	1.2 (0.48-3.0)	.69	
Suggested Seeking Support From Family and Friends to Make a Quit Attempt	6 (37/634)				
Control		4 (7/174)	1.00		.51
Self-study		7 (15/229)	1.5 (.58-3.9)	.40	
Workshop		7 (15/231)	1.7 (0.63-4.6)	.29	
Arranged Follow-up	3 (16/628)				
Control		1 (1/172)	1.00		.51
Self-study		4 (9/229)	5.8 (0.72-46)	.10	
Workshop		3 (6/227)	4.2 (0.48-37)	.20	

*Patient survey was mailed 12 months after dentists completed workshop or self-study training and one month after the patient visited the dentist.

†5 As: Ask, Advise, Assess, Assist and Arrange.

‡The number of patients' responses varies. The numbers do not add up to the overall total of 720 tobacco users owing to whether data relate to all patients, tobacco users only or only tobacco users who are willing to quit. In addition, not all patients answered all of the questions.

§The odds ratios are adjusted for the patient's age, race and ethnicity, sex and response to the attitude question, "Do you think dental offices should offer tobacco cessation services?"

¶At least one group is different from another.