Oral Screening and Brief Spit Tobacco Cessation Counseling: A Review and Findings


Abstract: This paper reviews five randomized controlled trials of brief spit (smokeless) tobacco (ST) cessation treatment by dental professionals consisting of oral cancer screening, cessation advice, self-help materials, and brief cessation counseling by a dental hygienist. In addition, original two-year findings from a randomized controlled trial to determine the effect of a dental-directed, peer-assisted ST intervention among high school baseball athletes in rural California (n=1084) are reported. In the latter study, results show sustained quitting at two years of 23 percent (32/141) in the intervention group and 13 percent (21/166) in the control group (OR=2.0, 95% CI 1.1-3.9) with subjects lost-to-follow-up considered non-quitters. The evidence presented supports the efficacy of oral screening and brief cessation counseling by dental professionals to promote ST cessation in the dental office or in athletic facilities. In addition, recommendations for policy and future research are presented.

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Although the prevalence of cigarette smoking has declined, the use of chewing tobacco and oral snuff, also known as spit (smokeless) tobacco (ST), has increased in the United States since the 1970s, especially the use of moist snuff among young males. Figure 1 shows that the prevalence of thirty-day use of moist snuff among males seventeen to nineteen years of age increased twenty-five-fold between 1970 and 1991. Figure 2 shows the prevalence of thirty-day snuff and chewing tobacco use for males in 1999 by age groups. There is a trend toward increased ST use among young males eighteen to twenty-five years of age has increased over the last decade. In 1999, the prevalence of current ST use was 14 percent among U.S. male high school students overall and 19 percent among white male students.

Athletes are known to be heavy users of ST. Studies have found between 20 and 40 percent use among male National Collegiate Athletic Association athletes playing baseball, football, golf, ice hockey, lacrosse, soccer, and water polo and wrestling. ST use also is reported to be common among American males living in rural areas, American Indians, and those employed in the military and the lumber industry. ST use is of concern since its negative health effects include oral cancer, oral leukoplakia (a premalignant lesion), hypertension, gingival recession and dental erosion (which may be sensitive to tooth brushing), dental caries, and nicotine addiction.

Because ST-associated oral health problems are visually detectable, dentists and dental hygienists are in a prime position to identify ST users and to provide cessation advice and treatment. For example, a large percentage of ST users have oral leukoplakia that is obvious to individuals when pointed out in their own mouths. In one study, 79 percent of ST users had observable oral leukoplakia, compared to 6 percent among non-ST users; in addition, among ST users, 85 percent of lesions were in the area where ST was placed. These oral lesions appear to motivate many ST users to make a quit attempt. They also may serve to reinforce the benefits of cessation since the lesions often heal quickly if the user refrains from ST use for at least two weeks.

Compared to the extensive research on smoking cessation, there are relatively few studies of treatment programs for ST users. Of the eleven randomized controlled trials of ST cessation treatment reported in the literature, only five evaluated programs implemented by dental professionals. In addition to reviewing these five studies, the purposes...
of this paper are to present original two-year findings of a community-based, dentist/hygienist-led ST intervention program for high school baseball athletes and to discuss implications for policy recommendations and future research.

**Dentist/Dental Hygienist-Led Cessation Studies**

Five randomized controlled trials were undertaken to determine if dentists and dental hygienists can be effective in promoting ST cessation (Table 1). Of these studies, two were conducted in dental office settings, and three were conducted in community-based settings outside the dental office. The dental office-based studies involved only daily ST users, whereas, in the community-based studies, ST use was more broadly defined to include monthly ST users. All of the cessation treatments tested in these studies shared four common components: an oral cancer screening with feedback about ST-related oral problems, tobacco cessation advice, self-help materials, and a single session of cessation counseling by a dental hygienist (referred to hereafter as the Oral Screening/Brief Counseling Model).
Dental Office-Based Studies

One dental HMO-based study examined the effectiveness of a single ST cessation intervention delivered by dental hygienists in the course of routine dental hygiene care.22 Male ST users at least fifteen years of age (n=518) were randomly assigned to usual care or to intervention conditions. The intervention included the Oral Screening/Brief Counseling Model and a nine-minute videotape on the negative health effects associated with ST use. Success was defined as no ST use at both three- and twelve-month follow-up as reported by subjects via interview or mailed questionnaire. Results indicated 18 percent quit in the intervention group and 13 percent quit in the control group (p ≤ 0.05), with nonresponders (17 percent) considered tobacco users. Among the ST users in the intervention group, 71 percent reported that the cessation advice delivered by the dental hygienist had been a major influence in their serious consideration of quitting ST use.

In the dental office-based study, seventy-five fee-for-service dental practices in Oregon were randomly assigned to an intervention or control group.23 Practices in both the intervention and control groups included an oral screening with feedback about ST-related problems, cessation advice, and self-help materials. The intervention group also included brief counseling by a dental hygienist. Success was defined as no ST use at both three- and twelve-month follow-up as reported by subjects via interview or mailed questionnaire. Results indicated 10 percent quit ST in the group that included the dental hygienist-delivered counseling compared to three percent in the control group. Although analyses did not account for randomizing practices instead of people (i.e., cluster adjustment), results would still be significant (p ≤ 0.05). The program, however, was not effective for cigarette smokers.

Studies in Athletic Facilities

In a pilot study of ninety-six professional baseball athletes, Greene et al. examined the effect of an oral cancer screening, with feedback about ST-related findings, and cessation advice by a dentist, with and without a fifteen to twenty minute session of ST cessation counseling by a dental hygienist.24 Ten baseball teams were randomly assigned to each group. The average time of follow-up was three months after baseline assessment, with a range of two to six months. Of ninety-six baseline ST users, fifty-four received...
follow-up assessments. Among subjects who returned at follow-up, 19 percent in the group with cessation counseling by a dental hygienist quit—that is, no ST use within the past thirty days. In contrast, among the subjects in the comparison group, no one quit. The 19 percent who quit would be reduced to 11 percent if nonresponders were assumed to be nonquitters.

The Oral Screening/Brief Counseling Model was also tested for efficacy in a paired-cluster randomized controlled trial among college baseball and football athletes in sixteen California colleges. In addition, a dental hygienist showed graphic photographs of facial disfigurement due to oral cancer and made two follow-up telephone calls to answer questions and provide support. Colleges in the control group received no intervention. Biochemically validated prevalences of quitting at one year (self-report of no use in the past thirty days) were 35 percent (n=171) and 16 percent (n=183) in the intervention and control groups, respectively (p ≤ 0.01). Thus, college athletes exposed to the brief treatment program by dental professionals were about twice as likely to quit ST use than athletes not exposed to the program.

A third test of the efficacy of the Oral Screening/Brief Counseling Model, plus a follow-up phone call and a peer-led component, was conducted among high school baseball athletes in rural California. The study examined prevention efficacy as well as cessation efficacy to promote ST cessation and discourage ST initiation. Forty-four high schools with baseball teams having at least 10 percent ST use were stratified by size of team and prevalence of ST use and randomized within strata to either the intervention group (twenty schools) or the control group (twenty-two schools). The control group received no intervention.

In the intervention group, the peer-led component consisted of a fifty-minute, interactive, team meeting that included a video, graphic slides of facial disfigurement associated with oral cancer and its surgical treatment, and a small-group discussion of ST advertisements targeting young males. Popular student opinion leaders were identified from the baseline questionnaire and were recruited and trained to lead a team meeting.

With the aid of a questionnaire, intervention content attempted to address major reasons for ST use by over half of the ST users. These reasons related to use of ST by role models, the need to belong, habit, the enjoyment of handling, and the need for stimulation (Table 2). For example, in an attempt to address reasons related to “role modeling” and “the need to belong,” student opinion leaders in the intervention group led a team meeting to promote informed decision making about ST use and showed a video of Major League baseball players discussing the negative aspects of ST use. The objective was to influence the social norm to support ST non-use. In addition, the behavioral counseling explained nicotine addiction and suggested coping strategies for ST use.

### Table 2. Reasons for ST use that were rated “most of the time” by over half of the ST users (N=307)

<table>
<thead>
<tr>
<th>Reasons*</th>
<th>% ST Users Responding “Most of the Time”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use by Role Models</strong></td>
<td></td>
</tr>
<tr>
<td>Because some of my favorite baseball players use.</td>
<td>87</td>
</tr>
<tr>
<td>Because guys I admire use it.</td>
<td>83</td>
</tr>
<tr>
<td><strong>The Need to Belong</strong></td>
<td></td>
</tr>
<tr>
<td>I use it to be cool.</td>
<td>76</td>
</tr>
<tr>
<td>Makes me part of a group.</td>
<td>65</td>
</tr>
<tr>
<td>It’s part of playing baseball.</td>
<td>63</td>
</tr>
<tr>
<td>Makes me feel part of the culture of baseball.</td>
<td>62</td>
</tr>
<tr>
<td><strong>Automatic Use</strong></td>
<td></td>
</tr>
<tr>
<td>I’ve found dip/chew in my mouth and didn’t remember putting it there.</td>
<td>77</td>
</tr>
<tr>
<td>I start to put a dip in my mouth without realizing I already have one.</td>
<td>76</td>
</tr>
<tr>
<td>I use it automatically without even being aware of it.</td>
<td>62</td>
</tr>
<tr>
<td><strong>Handling</strong></td>
<td></td>
</tr>
<tr>
<td>Part of the enjoyment comes from the steps I take to put it in my mouth.</td>
<td>63</td>
</tr>
<tr>
<td>Part of the enjoyment is moving it around in my mouth.</td>
<td>50</td>
</tr>
<tr>
<td><strong>Stimulation</strong></td>
<td></td>
</tr>
<tr>
<td>To stay alert.</td>
<td>65</td>
</tr>
<tr>
<td><strong>Withdrawal</strong></td>
<td></td>
</tr>
<tr>
<td>When I run out of dip/chew, I find it almost unbearable until I get some.</td>
<td>56</td>
</tr>
</tbody>
</table>

* ST users were given 28 items and asked to indicate how often each was a reason for their ST use. Possible responses were: “never,” “some of the time,” “most of the time.” Adapted from Horn’s Smokers Self-Test.33
cravings either to increase positive feelings or to decrease negative emotions and other withdrawal symptoms. Counseling also pointed out that ST use can be a highly automatic behavior intensely learned and practiced over time, so that the user can find himself using ST without deliberate realization or conscious desire. To address this automatic use of ST, counselors had athletes recall their ST use in a typical day to identify reasons for use and to target dips used automatically for initial elimination in planning a schedule to taper down ST use and gradually reduce nicotine exposure.

Eighty-one trained dentists and dental hygienists from study communities and seventy-nine student peer leaders from study baseball teams delivered the intervention. Questionnaire assessments of ST use at baseline and one year were supplemented by collection of saliva samples as a “bogus pipeline” (collecting samples of saliva on all participants for purposes of testing for nicotine but analyzing only a random subsample). Loss to follow-up was less than 20 percent in both control and intervention groups. Results at one year showed 27 percent sustained quitting (no use in the last thirty days) in the intervention group and 14 percent in the control group (odds ratio [OR] = 2.29; 95 percent confidence interval [CI] 1.36–3.87). Again, athletes in the brief dental-led treatment program were about twice as likely to stop ST use than athletes not exposed to the program. There was no significant difference between groups in the prevalence of initiation, however. When asked to select intervention components that most influenced them to stay tobacco-free or to try to quit tobacco use, 92 percent of all athletes (n=351) cited the graphic slides of facial disfigurement due to the surgical treatment of oral cancer, and 81 percent (n=330) cited the oral exam (Table 3).

At the one-year follow-up, all non-users of ST (N=730) were asked by questionnaire to identify three main reasons they did not use dip or chew from a list of twelve common reasons. Blank spaces also were provided for open-ended responses on the one-year follow-up questionnaire. Table 4 shows that two reasons—“concern about health risks” and “no need for it”—were checked by 65 percent of the respondents. The next most common responses were: “it’s a dirty habit” (50 percent) and “it’s addicting” (32 percent). Although modest, a statistically significant greater percentage of intervention subjects chose “concern about health risks” (70 percent intervention vs. 61 percent control, OR = 1.6, 95 percent CI 1.1-2.1) and “it’s addicting” (36 percent intervention vs. 28 percent control, OR = 1.5, 95 percent CI 1.1-2.0) compared to the control group. The intervention was not as influential on the athletes’ perception of “no need for it” (64 percent intervention vs. 66 percent control) or that “it’s a dirty habit” (53 percent intervention vs. 48 percent control). Although there was no significant difference in initiation rates between the groups, the intervention appears to have heightened concern over health risks and addicting potential of ST in players choosing not to use ST.

### Two-Year Findings Among High School Baseball Athletes

#### Procedures

As a continuation of the study of high school baseball athletes described previously, a two-year...
follow-up assessment was conducted in which each study subject was mailed a confidential follow-up questionnaire to determine his ST use status. Two weeks later, nonrespondents were contacted by telephone, and questionnaires were completed by the telephone interview. After three unsuccessful attempts to contact a subject by telephone within a two-week period, the two-year assessment was considered to be missing. Less than 10 percent loss to follow-up was achieved using financial incentives (i.e., respondents were included in drawings among their teammates for $150).

Statistical Methods

The primary outcome measure was whether baseline ST users quit at the one-month follow-up and “stayed quit” at both the twelve- and twenty-four-month follow-up. These data were analyzed in three ways. First, missing follow-up data were considered to indicate that the athletes did not quit their use of ST. Second, additional analyses excluded missing data assuming that data were missing completely at random. Third, a combined model was used that simultaneously tested cessation and prevention.

Initially, among baseline users, the probability of quitting was modeled using generalized estimating equation (GEE) models to account for clustering within school, the unit of randomization to intervention or control. Models used a logit link, binomial variance, and exchangeable working correlation structure, denoting that a baseball athlete has the same correlation as his teammates. GEE models are robust to misspecification of this working correlation structure. The primary analysis compared the probability of the primary cessation response (quitting at one month and not relapsing through twenty-four months) between the control and intervention schools, without adjusting for covariates, since randomization of schools is the basis for validity of this analysis. Supplemental models examined the baseline covariates as predictors and effect modifiers of the primary response. Final multivariable modeling of the cessation intervention adjusted for these significant baseline covariates and effect modifiers in a backward elimination fashion. In these analyses, missing data were handled in the two ways previously described.

A third model was used that simultaneously tested cessation and prevention. Baseline non-users who responded “no ST use” on all follow-up occasions were classified as non-initiators; others were considered to be initiators. This model of continuous twenty-four-month non-use had baseline use, group (intervention or control), and their interaction as predictors. The simple group effect corresponds to prevention (group difference among baseline non-users), while the baseline x group interaction corresponds to cessation (group difference among baseline users).

Results

Effectiveness of the Intervention on Cessation

Table 5 shows cessation results using both assumptions about missing data. When missing data were considered as “not quitting,” there was 23 percent quitting in the intervention group compared to 13 percent quitting in the control group (p=0.022; OR=2.05; 95% CI 1.10-3.78). This indicated that baseline users in the intervention schools were nearly twice as likely to quit and sustain twenty-four months of non-use as those in control schools. When missing data were excluded, results were slightly stronger (p=0.013; OR=2.37; 95% CI 1.20-4.67).

Effectiveness of the Intervention on Prevention and Cessation

Results from the combined prevention and cessation interaction are shown in Table 6 with similar ST cessation findings. The overall ST initiation, how-
ever, was 28 percent, and the cluster-adjusted estimate of the intervention effect was 1.03 (95% CI 0.75 – 1.41) indicating no significant effect (control, 28%; intervention, 27%). These initiation rates are likely inflated by the conservative approach of considering subjects with any missing recall data to be initiators.

**Predictors of ST Cessation**

When the intervention and control groups were combined, the following baseline variables were examined for their relationship to sustained quitting at twenty-four months with GEE models: year in school, race/ethnicity, first ST use of the day, frequency of ST use, self-efficacy (confidence to quit), smoking status, alcohol use, coach’s ST use, father’s ST use, and relative’s ST use.

Being a freshman or sophomore (OR=3.07; p<0.001) was significantly related to sustained twenty-four-month quitting. Although year in school was not a significant effect modifier, it was suggestive of an interaction of degree (that is, the intervention in younger players seemed to work better than in older ones; p=0.060). Self-efficacy (being very confident) was significantly related to sustained twenty-four-month quitting (OR=3.10, p<0.001), although self-efficacy (SE) was not a significant effect modifier (p=0.167). Frequency of ST use was significantly related to sustained twenty-four-month quitting, with those who use daily (OR=26.7; p<0.001) or weekly (OR=2.2; p=0.026) being less likely to sustain twenty-four-month quitting than those who use monthly; ST frequency was not an effect modifier (p≈0.677).

Being nonwhite (African-American, Asian/Pacific Islander, Native American, or Hispanic) was not related to sustained twenty-four-month quitting (p=0.700), nor was it an effect modifier (p=0.806). These racial/ethnic groups comprised 20 percent of the players. Reporting coach’s, father’s, or a relative’s ST use was also not related to twenty-four-month sustained quitting or an effect modifier. Neither smoking status (ever or current) nor alcohol use were related to twenty-four-month sustained quitting and neither were effect modifiers.

The final multivariable GEE model results are shown in Table 7. The effect modifiers that were no longer borderline significant were removed; first ST use of the day and using ST weekly were no longer significant and also removed one at a time. The final model shows that freshman or sophomore status, non-daily ST users, and very confident (highly self-efficacious) players were more likely to sustain twenty-four-month quitting. After adjusting for other important factors, intervention group players were still more than twice as likely to sustain quitting than control group players.

**Discussion**

Five published randomized controlled trials demonstrated that an oral cancer screening with feedback about ST-related oral problems, cessation advice, self-help materials, and brief cessation counseling by a dental hygienist (Oral Screening/Brief Counseling Model) promotes ST cessation, especially among individuals who are younger or less frequent users. The evidence presented supports the efficacy of the model as a brief ST cessation treatment by dental professionals in the dental office or in athletic facilities. In addition, these findings support the collaboration between dental professionals and com-
munity partners such as high school nurses and college athletic trainers, in order to provide oral cancer screening and ST cessation treatment to youth in athletic settings who are at risk for ST use and its associated negative health effects. Finally, the data emphasize the importance of early cessation intervention to prevent addicted ST use.

Gordon and Severson conducted a randomized controlled trial to test the effectiveness of two methods of disseminating ST cessation information to dental professionals throughout the western United States. Results indicated that workshops were more effective than self-study in effecting behavior change, although the self-study approach was more cost-effective. In another study of dental hygienists, dietitians, and nurse-midwives, findings suggested the importance of skills training, including the provision of actual or simulated counseling experience and modeling by others in the same professional group. Others have suggested a systematic clinical plan for providing cessation treatment based on the five A's (Ask about tobacco use; Advise to quit; Assess oral tissues, patterns of tobacco use, nicotine dependence, readiness to quit; Assist with educational materials and counseling to provide support and problem solving; and Arrange follow-up). It is important to note that, in two studies, brief counseling by a dental hygienist was demonstrated to significantly enhance ST cessation compared to providing only an oral cancer screening with feedback and cessation advice. This enhancement of outcome is not surprising since the single session of counseling delivered by a dental hygienist focused on helping the ST user to set a quit date, identify a plan, and develop skills to cope with cravings and triggers for use and to prevent relapse. Nevertheless, more addicted ST users may need referral for more intensive supportive and problem-solving treatment. Dentists and dental hygienists need to create a list of resources available in their community for referral if necessary.

Moreover, studies indicate that ST users are interested in receiving cessation advice from their dentist. For example, Severson and colleagues surveyed ST users in the dental office and in the community and found that 40-67 percent expressed interest in receiving cessation assistance from their dentists. Moreover, in a study that asked 473 ST-using college athletes to select three important items out of a list of eleven that might influence them to stop using ST, 63 percent indicated seeing beneficial changes in their teeth and gums due to ST use and 61 percent indicated a dentist advising him not to use.

Several studies support the need for educational interventions to increase dental professionals’ effectiveness in providing tobacco cessation counseling and in conducting oral cancer screenings. A 1997 survey of 1,746 dentists (generalists, periodontists, and pedodontists) and 723 dental hygienists in three U.S. geographical regions found that tobacco cessation activities are not a routine part of dental practice and that such activities and training vary by dentist type and geographical region. Tomar and colleagues also examined dentists’ effectiveness in advising patients who use tobacco to quit. These investigators concluded that dentists may not be maximizing their opportunities to advise their patients who use tobacco to quit or they are not adequately communicating to their patients the importance of quitting. A 1990 survey of all dental schools and dental hygiene programs in the U.S. found that students receive limited tobacco education.

Several other studies indicate that many oral health professionals feel unprepared to assume tobacco cessation roles. For example, a survey to assess the smoking cessation counseling activities of primary care physicians, dentists, dental hygienists, family planning counselors, WIC counselors, and community mental health counselors in four counties in the northeastern United States indicated that dental professionals felt less prepared to provide cessation advice and were less active in doing so than the other three professional groups.

Dental professionals, however, generally indicate a high degree of interest in continuing education in tobacco cessation. Stevens et al. found that oral health providers (independent dental practitioners and HMO dentists) expressed interest in further training on how to help their tobacco-using patients to quit. Also, in a survey of Maryland dental hygienists, the majority of respondents agreed that dental hygienists should be prepared to provide tobacco cessation education although they did not feel adequately prepared to do so. Moreover, data from a 1992 nationally representative sample of 12,035 adults eighteen years of age and older indicated that about half of adults had seen a dentist within twelve months and, of those, less than 10 percent reported an oral cancer screening by a dentist or hygienist within the past three years. In addition, only 24 percent of smokers reported they had been advised to quit smoking.
This apparent need to increase the provision of oral cancer screening and tobacco cessation treatment by dental professionals is of concern because all forms of tobacco are associated with oral and pharyngeal cancer and three-fourths of all deaths from these cancers are highly associated with tobacco use.\textsuperscript{51} Assessment of all forms of tobacco and cessation treatment in the dental office and in community programs provide an excellent opportunity for cancer prevention.

The public health implications of dissemination and widespread adoption of the Oral Cancer Screening/Brief Cessation Counseling Model are significant. For example, with regard to youth athletic programs, the 2000 National Household Survey on Drug Abuse reported that an estimated 14 million youth (56 percent) aged twelve to seventeen years participated in team sports during the past year.\textsuperscript{52} Of these youth, 2.3 percent or 322,000 used ST during the past month. The two-year quit rate of 24 percent, reported earlier in this paper, attributed to the Oral Screening/Brief Counseling Model, would translate into ST cessation by 77,280 adolescent athletes in the United States. Increased oral cancer screenings and tobacco cessation treatment by dental professionals should decrease oral cancer incidence and mortality and have a public health benefit for other tobacco-related morbidity as well.\textsuperscript{50}

In 1996, the Smoking Cessation Clinical Practice Guideline Panel and Staff of the U.S. Agency for Health Care Policy and Research developed specific guidelines and suggested that tobacco-use assessment and treatment should be covered by health care insurance.\textsuperscript{53} Similar guidelines need to be developed specifically for dental insurance coverage given the adverse oral health effects associated with ST use, the documented success of dental professionals in promoting ST cessation, and the oral health benefits associated with tobacco abstinence.

**Implications for Policy and Future Research**

The following recommendations, based on our research findings, are made to help transfer knowledge into action:

1. Disseminate the Oral Screening/Brief Counseling Model to dental practitioners via workshops that provide skills training, including actual or simulated counseling and modeling by dental professionals.\textsuperscript{38,39}

2. Prepare dental and dental hygiene students to be proficient in this evidence-based model so that it can become part of routine oral healthcare.

3. Update surveys of oral healthcare practitioners to document current oral cancer screening and tobacco prevention and cessation activities.

4. Conduct surveys of dental and dental hygiene educational programs to determine oral cancer screening and tobacco-related curriculum content.


6. Involve dental professionals in applying the Oral Screening/Brief Counseling Model in community settings, especially in youth athletic programs in order to contribute to oral health beyond the dental office.

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