

Interventions for tobacco cessation in the dental setting. A systematic review

A.B. Carr and J.O. Ebbert

Mayo Clinic College of Medicine, Rochester, MN.

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Oral health professionals have a unique opportunity to increase tobacco abstinence rates among patients who use tobacco. **Objective:** To assess the effectiveness of interventions for tobacco cessation offered to cigarette smokers and smokeless tobacco users in the dental office or community setting. **Research Design:** We searched standard electronic retrieval systems and databases including the specialized registers of the Cochrane Tobacco Addiction Group and the Cochrane Oral Health Group through 2006. Selection criteria included randomised and pseudo-randomised clinical trials assessing tobacco cessation interventions for tobacco users conducted by oral health professionals in the dental office or community setting. The most rigorous abstinence outcome reported with at least six months of follow-up was recorded. Data collection and analysis involved two authors who independently reviewed abstracts for inclusion and abstracted data from included trials. **Results:** Six clinical trials assessing the efficacy of interventions in dental office or school community settings were included. All studies assessed the efficacy of interventions for smokeless tobacco users, one also included cigarettes smokers, all employed oral exam and behavioral components, and one offered pharmacotherapy. The results showed that interventions conducted by oral health professionals increase tobacco abstinence rates (OR 1.44; 95% CI: 1.16-1.78) at 12 months or longer. Heterogeneity was evident and could not be adequately explained through subgroup or sensitivity analyses. **Conclusions:** Available evidence suggests that behavioral interventions for tobacco use conducted by oral health professionals incorporating an oral exam component in the dental office and community setting increase tobacco abstinence rates.

Key words: behavioural intervention, dental intervention, tobacco cessation

Introduction

In addition to the well-known harmful effects of smoking on respiratory and cardiovascular systems, tobacco use has also been shown to have significant adverse effects on oral health. Cigarette smoking is associated with an increased risk for oral disease as tobacco exposure is considered the major inducer of oral squamous cell carcinoma (SCC), reflective in the fact that the incidence of oral SCC is four to seven times greater in smokers than non smokers (Piyathilake *et al.*, 1995). Tobacco exposure is also harmful to periodontal health, and smoking status is an important factor in the prognosis for periodontal therapy, oral wound healing, implant therapy, and cosmetic dentistry (Mecklenburg, 1998). Cigarette smoking is causally associated with an increased prevalence and severity of periodontitis (Gelskey, 1999), even when adequate oral hygiene is practiced (Kerdvongbundit and Wikesjo, 2002).

Smokeless tobacco use is also harmful to oral health and has been reported to cause tooth decay and gingival recession, especially in users with co-existing gingivitis (Offenbacher and Weathers, 1985). Smokeless tobacco use in the United States has been associated with an increased risk for oral cancer in a dose-response fashion (Stockwell and Lyman, 1986). Risk may vary depending upon the type of smokeless tobacco used, as the high-

est rates of oral cancer are observed in countries where smokeless tobacco is consumed with additives (e.g., areca nut) (Critchley and Unal, 2003).

The dental practice setting provides a unique opportunity to assist tobacco users in achieving tobacco abstinence (Christen *et al.*, 1990). Within the context of an oral health recall system, patients who present for repeat visits provide an opportunity for providers to influence tobacco users to discontinue their habit; a repeat counselling exposure that is appropriate for this chronic addiction problem. Widespread acceptance of tobacco use interventions in the dental setting have been lacking and limitations in primary care resources have curtailed further efforts (Warnakulasuriya, 2002). While barriers to providing tobacco cessation service have been repeatedly demonstrated and priorities to manage them outlined (Needleman *et al.*, 2006), effective interventions must be identified to maximize future strategic plans for dental professional involvement in tobacco cessation.

The purpose of this review was to assess the effectiveness of interventions for tobacco cessation offered to cigarette smokers and smokeless tobacco users in the dental office or community setting. We were interested in testing the hypotheses that brief counseling cessation interventions provided in a dental setting are more effective than usual care for increasing tobacco abstinence rates among tobacco users.

Method

Criteria For Considering Studies For This Review

Types of studies: All randomised and pseudo-randomised controlled trials were included. The unit of randomization was the dentist or practice for the studies in the dental office setting, and college or high school for the studies in the community setting.

Types of participants: Patients of any age reporting tobacco use and receiving oral health interventions by dental professionals were included. All tobacco users, those actively seeking treatment and those who did not express an interest in quitting, were included.

Types of interventions: Any intervention to promote tobacco use cessation, which included a component delivered by a dentist, dental hygienist, dental assistant or office staff in the dental practice setting and any combination of these, as well as the same individuals providing intervention as part of a community effort were included.

Types of outcome measures: The outcome measure was tobacco use cessation, assessed at least six months from the delivery of the intervention. Biochemical validation of self-reported cessation was not required but was recorded.

Search Strategy For Identification Of Studies

The Tobacco Addiction and Oral Health Group trials registers of the Cochrane Collaboration along with 11 standard electronic retrieval systems and databases were searched. A variety of terms were used to describe participants, interventions, outcomes, and intervention environment. There were no language restrictions and experts in the field were contacted to locate unpublished studies in an effort to minimize publication bias.

Review Methods

The records retrieved by the searches were screened for potential relevance by two reviewers against stated inclusion criteria. Studies of possible relevance were reviewed for inclusion or exclusion by two reviewers, and data were extracted by both reviewers independently and compared. Lack of agreement was resolved by discussion and consensus.

For each study, information about site, method of randomisation and allocation concealment, method of participant selection, characteristics of the intervention and participants, and outcome assessment were extracted. The tobacco cessation outcome with the most rigorous definition of outcome available, with regards to maintenance of abstinence (i.e., continuous vs. point prevalence) and type of tobacco abstinence (i.e., all tobacco vs. smokeless tobacco only), was the outcome recorded. Cessation rates were based on an intention-to-treat analysis with dropouts and losses to follow-up assumed to be continuing tobacco users. The outcome from each trial was expressed as an odds ratio (OR) and a pooled weighted average of ORs was estimated using a fixed effects model, Mantel-Haenszel method, with 95% confidence intervals. If studies to be pooled had corrected for clustering, and therefore generated ORs that do not derive directly from numbers of quitters, pooling used the generic inverse variance method.

We hypothesized that heterogeneity might be explained by characteristics of patients, intervention, outcomes, or method of randomization, which was explored through subgroup analyses. We assessed heterogeneity using I^2 (Higgins *et al.*, 2003).

Description Of Studies

The review included six studies (Andrews *et al.*, 1999; Gansky *et al.*, 2002; Gansky *et al.*, 2005; Severson *et al.*, 1998; Stevens *et al.*, 1995; Walsh *et al.*, 1999). One study had to be excluded due to unavailability of subgroup denominator values from the authors (Cohen *et al.*, 1989). An additional study (Walsh *et al.*, 2003) providing 1-year outcome data for an included study (Gansky *et al.*, 2002) was retained in order to conduct a sensitivity analysis with 2-year outcomes vs. 1-year outcomes. Three studies were conducted in the dental office setting (Andrews *et al.*, 1999; Severson *et al.*, 1998; Stevens *et al.*, 1995), and three involved oral health professionals (dentists and dental hygienists) providing interventions to athletes within high school or college community settings (Gansky *et al.*, 2002; Gansky *et al.*, 2005; Walsh *et al.*, 1999). Additional study characteristics are described in Table 1.

Methodological Quality Of Included Studies

Report of randomization in two studies (Gansky *et al.*, 2002; Gansky *et al.*, 2005) was sufficient and rated "A." The remaining studies did not report how randomization was performed or reported it in insufficient detail to determine whether a satisfactory attempt was made to control for selection bias. Pseudo-randomization based upon last digit of patient identification number was used in one study (Stevens *et al.*, 1995).

No biochemical confirmation was used to validate self-report in three studies (Andrews *et al.*, 1999; Gansky *et al.*, 2005; Severson *et al.*, 1998). In the remaining three studies, biochemical confirmation was initially utilized and abandoned (Stevens *et al.*, 1995), or used to enhance self-report (Gansky *et al.*, 2002; Walsh *et al.*, 1999). Ability to blind was limited due to the nature of the behavioral interventions evaluated. One school-based study reported a 'spill-over' bias (Gansky *et al.*, 2005) that was felt to influence the outcomes.

Results

All analyses were conducted following adjusting for clustering of patients within practices and schools using the reported ICCs and generic inverse variance method.

When the six clinical trials of dental interventions compared to usual care or no contact controls are pooled (including all tobacco users), a statistically significant increase in the odds of tobacco abstinence at 12 months or more was observed (OR 1.44; 95% CI: 1.16-1.78) but heterogeneity was evident between the studies ($I^2 = 71.4\%$; Figure 1).

Heterogeneity was explored by assessing the prespecified potential explanations, however no source was defined and therefore the heterogeneity is not well-explained.

Table 1. Study Characteristics Of Included Studies

	<i>Andrews '99</i>	<i>Gansky '02</i>	<i>Gansky '05</i>	<i>Severson '98</i>	<i>Stevens '95</i>	<i>Walsh '99</i>
<i>Site</i>						
Dental Office	X			X	X	
Community		X	X			X
<i>Type</i>						
Smokers				X		
SLT users	X	X	X		X	X
<i>Intention</i>						
Seeking treatment		X	X			X
Not seeking treatment	X			X	X	
<i>Age</i>						
≥ 15 y/o	X			X	X	
Male only					X	
No age restriction		X	X			X
<i>Intervention</i>						
Counseling	X	X	X	X	X	X
Nicotine gum						X
Randomization						
<i>Patient</i>						
Practice	X			X	X	
School		X	X			X
<i>Follow-up</i>						
12 months	X		X	X	X	X
24 months		X				
<i>Outcome</i>						
All tobacco abstinence	X		X	X	X	X
Point prevalence (PP)			X		X	X
1 week PP					X	
30 day PP		X	X			X
Continuous 3 & 12 mos	X			X		
No current tobacco use		X				

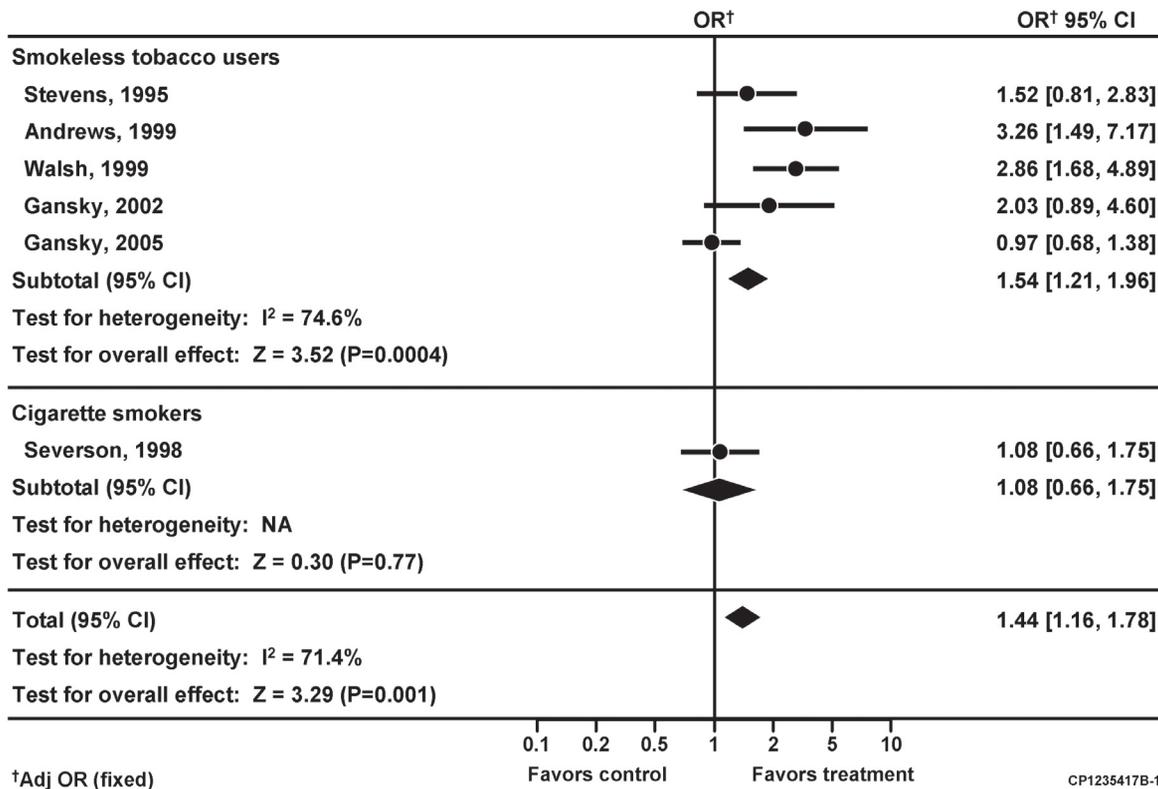


Figure 1. Interventions for tobacco use in dental setting: Interventions vs usual care for smokers and smokeless tobacco users

Discussion

While this review reveals that limited published literature exists assessing the impact of tobacco use interventions conducted by oral health professionals, the available evidence is consistent with the hypothesis that dental interventions conducted in the dental office and school community setting are more effective than usual care for promoting tobacco use cessation. The pooled tobacco abstinence at 12 months was 1.44 (95% CI: 1.16-1.78). Although the overall effect of the intervention may be small, the pooling of the studies in this review represents tobacco abstinence at 12 months or longer. Reporting of 12-month outcomes or longer may associate more closely with life-long tobacco abstinence and be less likely to give false positive results.

All of the studies included in this review included brief advice to quit by either a dentist or a dental hygienist, and the beneficial effect of brief advice by a dental professional agrees with earlier reports for physicians (Lancaster and Stead 2004). At this time, an insufficient number of studies are available to determine what specific intervention components provide additional effectiveness beyond brief advice by the dental professional, although the combination of an oral exam, personalized feedback from a dental professional regarding tissue damage from tobacco, a strong message to quit, brief problem solving and supportive counselling have been demonstrated or described to be helpful measures (Walsh 1999, Stevens et al 1995). The specific benefits of providing personalized feedback from an oral exam that identifies negative tissue effects stemming from tobacco use could prove to be a significant cessation tool, especially in individuals who may be unrealistically optimistic about their susceptibility to disease.

While smokeless tobacco is fairly well represented, the literature does not provide strong evidence for cigarette smoking cessation interventions in the dental setting. The single study investigating smokers failed to show an intervention difference (Severson et al, 1998), unlike an earlier study which utilized free nicotine gum along with chart reminders to cue professionals to engage patients in brief conversation regarding their cessation efforts but which failed to meet inclusion criteria for this review (Cohen *et al.*, 1989). To date, the opportunity to identify intervention influences due to repeated exposures is hindered by a lack of evidence.

The results of our meta-analysis should be interpreted with caution in light of potential methodological limitations. The existence of publication bias cannot be ruled out as unpublished reports may not be represented in the effect estimate. The methodological quality of the studies also could be a source of concern due to the inability to blind, unclear methods of treatment allocation, tobacco cessation validation based upon self-reports, and inconsistent content and delivery of dental-specific intervention within the pooled studies. Additionally, significant heterogeneity was evident in the included studies and the source of heterogeneity is unclear

Conclusions

The positive implications for practice derived from this review are that interventions for tobacco users in the dental setting, either in the dental office or in the school community, increase the odds of quitting tobacco. The evidence is derived largely from interventions used for patients using smokeless tobacco, making it difficult to draw strong conclusions about the effectiveness of these interventions for cigarette smokers.

Regarding the state of research for dental interventions, additional study of tobacco cessation within the dental office setting is important to identify critical intervention components which are effective for this group of providers in this clinical setting. It is especially important to expand the knowledge base for interventions targeting cigarette smokers.

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