

# A review of strategies to stimulate dental professionals to integrate smoking cessation interventions into primary care

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**Objective:** To summarise evidence regarding the effectiveness of various implementation strategies to stimulate the delivery of smoking cessation advice and support during daily dental care. **Basic research design:** Search of online medical and psychological databases, correspondence with authors and checking of reference lists. Only studies were selected which examined a support strategy to promote tobacco use cessation having a component to be delivered by a dentist, dental hygienist or dental assistant in the daily practice setting. Furthermore only controlled studies and systematic reviews were included. Methodological quality and outcomes were independently summarised and checked by two reviewers. **Results:** Eight studies met the inclusion criteria: 4 addressed strategies aimed at the dental professional and 4 addressed strategies aimed at both professional and patient. Only 4 of the studies were of a good quality. The 8 studies used combinations of implementation strategies, which made it difficult to evaluate the effectiveness of distinct components. Professional education appeared to enhance motivation for smoking cessation activities and advice giving. Organisational interventions (e.g. protocols, involvement of the whole team, referral possibilities) and incorporation of patient-oriented tools also contributed to the delivery of smoking cessation interventions. **Conclusions:** Multifaceted support strategies positively influence dental professionals' knowledge of smoking and smoking cessation, their motivation to give advice and their performance. As only 4 studies were of good methodological quality, it was not possible to draw firm conclusions about specific components. Additional research is needed to unravel which strategies best stimulate the provision of smoking cessation advice and support during daily dental practice.

**Key words:** smoking cessation interventions, implementation, barriers, facilitators, daily dental practice, supportive strategies

## Introduction

Smoking tobacco is still one of the leading preventable causes of death and is a causal factor in respiratory and cardiovascular diseases and cancer. Guidelines for tobacco addiction therefore recommend health care professionals to encourage patients to stop smoking and to provide cessation support. As part of the health care system dental professionals - dentists as well as dental hygienists and practice assistants - are called upon to play an important role in the primary and secondary prevention of tobacco addiction (Fiore *et al.*, 2000).

Smoking cessation is important for dental health and the need to integrate advice and support cessation into daily dental practice is obvious. Smoking affects oral health by: increasing the incidence of periodontitis with its associated risk of attachment loss, formation of pockets and alveolar bone loss; decreases the success of dental treatment (e.g. implant failure, delayed wound healing); increases peripheral vasoconstriction adversely affecting surgery; increases the risk of oral cancers; and discolours teeth (Alkhatib *et al.*, 2005; Gordon *et al.*, 2006; Johnson, 2004).

Given the frequency and regularity of contact with patients, dental professionals also have opportunities to intervene: eighty-eight percent of Swedes visit the dentist annually (Helgason *et al.*, 2003). Dentists can typically see if patients smoke and address the issue of smoking cessation in light of its associations with oral health. Patients

considered raising the discolouration of teeth an excellent opportunity for dentists to discuss the effects of smoking and the need to stop (Alkhatib *et al.*, 2005).

Despite the clear associations between smoking, oral health and the opportunities for dental professionals to intervene, the role of the dental professional in the treatment of tobacco addiction has been limited (Helgason *et al.*, 2003). Guidelines for the treatment of tobacco addiction recommend several interventions to support the patients - from brief advice to the delivery of pharmacotherapy and counselling support (Fiore *et al.*, 2000). Research identifies both stimuli and barriers to the provision of smoking cessation interventions during daily dental care. In the field of dental professionals' attitudes to giving of smoking cessation advice and support, 54.7 % of dentists agree that giving the advice is a part of their daily work but lack of time and training were the greatest barriers to giving it (Chestnutt and Binnie, 1995). Dentists are also concerned that smokers will leave their practices when urged to stop smoking. Dental hygienists are more likely than dentists to consider tobacco cessation counselling part of their work (Helgason *et al.*, 2003). Dentists who had been trained to provide smoking cessation counselling did take more time to advise their patients (Johnson, 2004; Cohen *et al.*, 1989).

It is still unclear which smoking cessation interventions are best suited for daily use in dental practice and what strategies can stimulate dental professionals to adopt the

relevant guidance. Therefore a systematic review of the relevant literature was undertaken to collect the evidence regarding the effectiveness of strategies for the delivery of smoking cessation advice and support during daily dental care.

## Methods

The subject of this systematic review was defined as strategies to stimulate the delivery of smoking cessation support in dental practices. Any support strategy aimed at the provision of tobacco use cessation interventions (partly or wholly) in the primary care dental practice setting was included. The intervention had to be aimed at the dental professional (dentist, dental hygienist or practice assistant) or jointly at the patient and professional with those strategies aimed at the patient alone being excluded.

The strategies could include educational components (e.g. professional training, counselling), organisational components (e.g. protocols for the provision of brief cessation advice, referral system for other sources of patient support), financial components (i.e., reimbursement for executing the intervention), other components (e.g., provision of self-help materials, pharmacotherapy) and various combinations of components. Our research question focuses on the effectiveness of the various approaches to encourage dentists and dental team members to be involved in smoking cessation efforts.

Four types of study were initially included: randomised controlled trials controlled clinical trials, pre-test/post-test studies and systematic reviews. Those studies' outcome measures were: assessments of effectiveness of support strategies such as numbers of smoking patients subjected to a smoking cessation intervention, self-reported smoking cessation rates at 6 or more months, biochemically verified smoking cessation at 6 or more months; or measures of professional performance which might be self-reported or patient reported; or assessment of factors influencing support strategies aimed at the professionals or both professionals and patients including organisational factors, educational factors, financial factors and other factors.

The EPOC checklist (Cochrane Effective Practice and Organisation of Care group, 2008) formed the basis of decisions on study quality: 1, concealment of condition allocation as a protection against selection bias; 2, follow-up of professionals as a protection against exclusion bias; 3, follow-up of patients or episodes of care; 4, blind assessment of primary outcomes as a protection against detection bias; 5, baseline measurement; 6, reliable outcome measures; 7, protection against contamination; and, 8, description of study characteristics including using a similar second site as control and intervention fidelity.

Two categories of study quality were distinguished: good and moderate. Good quality studies had to fulfil at least the criteria numbered 1, 4, 5, 7 and 8 listed above. Moderate quality studies had to meet at least the criteria 1, 5 and 7. Those studies not qualifying as moderate or good were excluded from further consideration.

For the identification of possible modifying factors, the organisational, professional and patient factors were derived from a comprehensive model of the domains and factors influencing smoking cessation services (Jané-Llopis, 2003).

The electronic systems and databases searched for studies published between January 1967 and March 2009 were Pub med, Embase, PsychINFO and Cochrane. To define the types of studies of interest, the search terms *randomized* and *controlled* were used. To define the types of participants of interest, the search terms *dental* and *dentist* were used. To define the relevant interventions, the following search terms were used: *smoking*, *smoking cessation*, *tobacco-use cessation*, *counselling*, *counseling*, *counsel*, *dental education*, *health promotion*, *patient education*, *health advice*, *intervention*, *interventions*, *health education* and *motivational*.

The Medical Subject Headings in Pub Med were also used to identify relevant interventions (smoking, intervention, counselling dental). The selection was restricted to publications in English, French or German.

Two authors (AJ, JR) independently judged the eligibility of studies based upon their titles and abstracts. Differences of opinion were reconciled via discussion. Based upon a reading of the full article, information was extracted independently with regard to study design, setting (e.g., country and type of practice), type of support strategy, type of outcomes and methodological quality. Qualitative descriptive analyses were undertaken with regard to various design and intervention features and the results of each study.

## Results

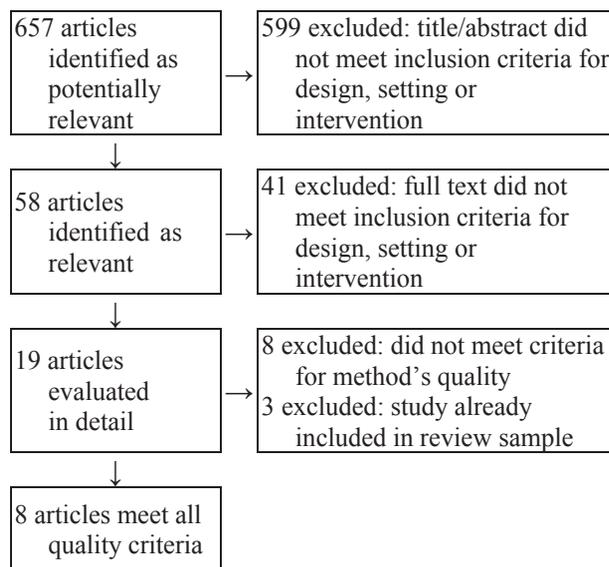
We found 657 articles potentially examining support strategies and factors influencing the provision of smoking cessation advice for dental patients and smoking cessation rates. On initial inspection of the titles and abstracts of the articles, 599 articles were excluded as not relevant for our study leaving 58 articles for further inspection. Reading of the full texts of the articles showed that 17 of the articles met the inclusion criteria with regard to design, setting and type of intervention. Of these articles, 3 - Carr (Carr and Ebbert, 2007), Dyer (Dyer and Robinson, 2006), Gordon (Gordon *et al.*, 2006) - met the inclusion criteria but were nevertheless excluded because they overlapped already included separate studies. The authors of the studies selected for inclusion in the review were next contacted for more information to help us assess the quality of the reported research. Although the results of two studies were reported in more than one publication, the results of all the publications selected for inclusion in our review will be summarised below.

The methodological quality of the initial 14 studies was found to vary (Table 1). Based on the quality criteria, 4 good quality studies (Albert *et al.*, 2004; Barnfather *et al.*, 2005; Secker-Walker *et al.*, 2000 ; Gordon *et al.*, 2005, 2006) and four moderate quality studies (Havlicek *et al.*, 2006; Houston *et al.*, 2008; Little *et al.*, 2009; Severson *et al.*, 1998a) were selected for inclusion in the final review. The methodological quality of the remaining 6 studies was judged to be inadequate for inclusion in this study (Campbell *et al.*, 1999, 2001; Cohen *et al.*, 1987, 1989; Humphris and Field, 2004; Smith *et al.*, 1998; Wood *et al.*, 1997) and Table 2 identifies their individual weaknesses. Figure 1 presents the numbers of studies included during each stage of review.

**Table 1.** Quality of the retrieved 14 studies based on EPOC criteria

Study	1. Concealment of allocation	2. Follow-up of professionals	3. Follow-up of patients or episodes of care	4. Blind assessment of primary outcomes	5. Baseline measurements	6. Reliable outcome measures	7. Protection against contamination	8. Description of study characteristics	Quality rating
Albert	✓	✓	✗	✓	✓	✗	✓	✓	Good
Barnfather	✓	na	✓	✓	✓	✓	✓	?	Good
Campbell	?	-	?	?	✓	?	?	?	Inadequate
Cohen (1987)	✗	na	✗	?	?	?	✓	?	Inadequate
Cohen (1989)	✗	na	✗	✗	?	?	✓	?	Inadequate
Gordon	✓	✗	✗	✓	✓	?	✓	✓	Good
Havlicek	✗	✗	?	✓	-	?	✓	✗	Moderate
Houston	✓	✗	✓	-	✓	?	✓	✓	Moderate
Humphris	✓	na	✗	✓	✓	✓	?	?	Inadequate
Little	✓	✓	✗	✗	✓	?	✓	✗	Moderate
Secker-Walker	✓	✓	na	✓	na	?	✓	✓	Good
Severson	✓	na	✗	✗	✓	✓	✓	?	Moderate
Smith	na	✗	✗	✓	✓	✗	?	?	Inadequate
Wood	na	na	✓	✗	✓	✗	✓	?	Inadequate

Key: ✓ done; ✗ not done; ? not clear; na not possible/not necessary; Good quality entailed at least concealment of condition allocation, blind assessment of primary outcomes, baseline measurement, protection against contamination and report of study characteristics; Moderate quality studies included at least concealment of condition allocation, baseline measurement and protection against contamination.



**Figure 1:** Flowchart of study inclusion

**Table 2.** Studies excluded due to inadequate methodological quality together with their support strategies

Study	Support strategy		
	Educational	Organisational	Financial
Campbell (Campbell <i>et al.</i> , 1999; Campbell <i>et al.</i> , 2001)	office cessation manual patient education material	-	-
Cohen (Cohen <i>et al.</i> , 1987)	dentist training (1x60min) educational materials in the practice	practice cessation protocols	free prescription of gum
Cohen (Cohen <i>et al.</i> , 1989)	dentist training (1x60min) educational materials in the practice	practice cessation protocols recall system	free rescription of nicotine gum
Humphris (Humphris and Field, 2004)	education of patients via information leaflet	-	-
Smith (Smith <i>et al.</i> , 1998)	educational packs for the dental team	practice cessation protocols	-
Wood (Wood <i>et al.</i> , 1997)	training (1x90min) in office; instructions on smoking's effects on general and oral health, effectiveness of systematic approach to tobacco cessation, effects of using smokeless tobacco, pharmacological and behavioural aspects of nicotine use and addiction	practice cessation protocols	-
			Other
			feedback on performance tele conferences
			chart reminder system on patient chart nicotine gum carbon monoxide-analyses
			pharmacological support, nicotine gum co-analyses
			patient leaflet
			patient education materials pharmacological support salivary tests phone number national helpline
			feedback (after 2 weeks) by the educator

**Table 3.** Studies included in review and their support strategies and outcomes

A: Studies of support strategies aimed at dental professionals

Study	Type	Support strategies			Outcomes*
		Educational	Organisational	Financial and Other	
Albert (Albert <i>et al.</i> , 2004)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>• training 60 min + 3x9 min follow up visits (for all dental professionals), face-to-face training in office</li> <li>• feedback on performance</li> <li>• educational materials in the practice</li> </ul>		<ul style="list-style-type: none"> <li>• Financial: reimbursement</li> <li>• pharmacological support, instruction on prescription of NRT</li> </ul>	<ul style="list-style-type: none"> <li>• costs of intervention +</li> <li>• acceptance of educational visits +/-</li> <li>• repeated outreach visits +</li> </ul>
Havlicek (Havlicek <i>et al.</i> , 2006)	CBA (Controlled before after (pre/post design))	<ul style="list-style-type: none"> <li>• training, 2 x 60 min for all professionals (1: 5 A model, 2: prescription of pharmacotherapy and help lines)</li> <li>• feedback on performance</li> <li>• telephone support</li> </ul>	<ul style="list-style-type: none"> <li>• practice cessation protocols</li> <li>• reminder stickers</li> </ul>	<ul style="list-style-type: none"> <li>• electronic newsletter</li> <li>• access to telephone based programs</li> </ul>	<ul style="list-style-type: none"> <li>• use of the 5 A model +</li> <li>• documentation of smoking behaviour of patients +</li> <li>• referral to a tobacco cessation helpline +</li> <li>• prescription of pharmacotherapy +</li> <li>• training with focus on whole team (critical for success) +</li> <li>• follow-up, to keep contact +</li> </ul>
Secker Walker (Secker-Walker <i>et al.</i> , 2000)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>• -dental team training (1 x 60 min) (role playing brief cessation protocol)</li> </ul>	<ul style="list-style-type: none"> <li>• practice cessation protocols</li> <li>• referral system, collaboration with other health systems</li> </ul>	<ul style="list-style-type: none"> <li>• coalition programme on county level</li> </ul>	<ul style="list-style-type: none"> <li>• willingness to provide cessation advice (self-reported) +</li> <li>• short advice +</li> <li>• willingness to counsel +</li> <li>• referral to stop smoking groups +</li> <li>• after 5 years: effect on behaviour +</li> </ul>
Houston (Houston <i>et al.</i> , 2008)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>• -online educational programme (designed to support oral cancer prevention in dentistry)</li> </ul>	<ul style="list-style-type: none"> <li>• practice tools</li> <li>• feedback system</li> <li>• internet support</li> </ul>	<ul style="list-style-type: none"> <li>• website including the possibility to chat and question</li> <li>• patient education materials</li> </ul>	<ul style="list-style-type: none"> <li>• number of internet site visits +</li> <li>• type of internet site visited +</li> <li>• advice to stop smoking +</li> <li>• asking about smoking status+</li> </ul>

Table 3. continued over ...

## B: Studies of support strategies aimed at both dental professionals and patients

Study	Type	Support strategies			Outcomes*
		Educational	Organisational	Financial and Other	
Barnfather <i>et al.</i> , 2005)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>education of patients (about effects on oral health, counselling on smoking cessation)</li> </ul>	<ul style="list-style-type: none"> <li>salivary nicotine test</li> </ul>	<ul style="list-style-type: none"> <li>Professional: –</li> <li>Patient:               <ul style="list-style-type: none"> <li>quit rates (17% increase at 8 weeks) +</li> <li>biochemically verified smoking cessation, carbon monoxide level at 8 weeks +</li> <li>acceptance of salivary tests by patients, perceived help in quitting +</li> <li>feedback increased motivation to quit +</li> </ul> </li> </ul>	
Gordon (Gordon & Severson, 2001; Gordon <i>et al.</i> , 2006)	CBA (Controlled before after (pre/post, time series design), group 1 first used as control then as intervention, group 2 immediately as intervention group)	<ul style="list-style-type: none"> <li>training (1x180 min) for all practitioners on brief motivational interviewing, intervention 5 A model, prescription of NRT, role playing exercises</li> </ul>	<ul style="list-style-type: none"> <li>5 A model</li> <li>referral to quit lines</li> </ul>	<ul style="list-style-type: none"> <li>pharmacological support, nicotine gum, patches</li> <li>educational materials</li> <li>Professional:               <ul style="list-style-type: none"> <li>advice, counselling behaviour +</li> </ul> </li> <li>Patient:               <ul style="list-style-type: none"> <li>smoking cessation +</li> <li>after 3 months 15.5% intervention group vs 4.3% control group</li> <li>after 6 months 18.8% intervention group vs. 4.6% control group</li> <li>after 3 and 6 months 13.1% intervention group vs. 2.7% control group</li> </ul> </li> </ul>	
Severson (Severson <i>et al.</i> , 1998a)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>training (1x 180 min) for dentist, dental hygienists and other staff members in the clinic (didactic and interactive training on identification of tobacco-using patients and counselling of them to quit using tobacco), actual interventions were carried out primarily by dental hygienists</li> </ul>	<ul style="list-style-type: none"> <li>practice cessation protocols</li> <li>patient education materials (video)</li> </ul>	<ul style="list-style-type: none"> <li>Financial: patients who responded the questionnaire were eligible for a 100 dollar monthly lottery</li> <li>in extended condition: quit attempts +</li> <li>shifts in motivation to quit –</li> <li>sustained self-reported abstinence at 3 months               <ul style="list-style-type: none"> <li>smokers: care as usual 4.7%</li> <li>minimal intervention 5.1%</li> <li>extended intervention 5.6%</li> <li>smokeless tobacco users: care as usual 8.8%</li> <li>extended intervention 5.6%</li> </ul> </li> <li>Sustained self-reported abstinence at 12 months               <ul style="list-style-type: none"> <li>smokers: care as usual 2.4%</li> <li>minimal intervention 2.6%</li> <li>extended intervention 2.5%</li> <li>smokeless tobacco users: care as usual 17.8%</li> <li>extended intervention 10.2%</li> </ul> </li> </ul>	
Little (Little <i>et al.</i> , 2009)	RCT (Randomised controlled trial)	<ul style="list-style-type: none"> <li>individual practice training (to offer brief tobacco counselling and encourage patients to talk to counsellors by telephone)</li> </ul>	<ul style="list-style-type: none"> <li>assisted referral method</li> <li>team approach</li> <li>patient referral in office to telephone tobacco counsellors</li> </ul>	<ul style="list-style-type: none"> <li>patients making call to the counsellor +</li> <li>referral dental hygienist &gt; dentists</li> <li>chair-side counselling +</li> <li>patient satisfaction with dental team's tobacco-control efforts +</li> </ul>	

\*Outcomes coded: + positive effect; +/- neither positive nor negative effect; – negative effect; ? unknown effect

All the 8 moderate-to-good quality studies were from the US and their characteristics are summarised in Table 3. Six were randomised controlled trials and 2 involved pre-test/post-test designs. (Gordon and Severson, 2001; Gordon *et al.*, 2006; Havlicek *et al.*, 2006)

Four types of support strategies were identified: educational, organisational, financial and other. Four of the studies were aimed at the dental professional or dental professional and patient (Barnfather *et al.*, 2005; Gordon and Severson, 2001; Gordon *et al.*, 2005; Little *et al.*, 2009; Severson *et al.*, 1998a). The other four were aimed at the dental professional only (Albert *et al.*, 2004; Havlicek *et al.*, 2006; Houston *et al.*, 2008; Secker-Walker *et al.*, 2000).

Considering the effectiveness of support strategies aimed at dental professionals, before turning to those also including patients, all four of the studies included educational elements. Three studies described the effect of training on the dental team, all reporting positive results. Albert *et al.* (2004) described the effects of the following: a one-hour training for the entire dental team, feedback on performance, academic detailing (i.e., face-to-face educational outreach visits on 3 occasions each of 9 minutes duration) and the provision of educational materials within the practice. Increased face-to-face contact reduced the amount of resistance of starting smoking cessation advice and/or counselling and increased the clinicians' knowledge of the relation between smoking and oral health and their confidence. Lack of knowledge was reported to be a barrier. The effects of the intervention on the counselling behaviour of the professionals are not described clearly. Problems were encountered in motivating the dentists to be involved in both smoking cessation and in their education (Albert *et al.*, 2004).

Havlicek trained dental professionals on two occasions, both lasting an hour (Havlicek *et al.*, 2006). The training included a description of the 5A model: 1, ask about tobacco use; 2, advise to quit; 3, assess willingness to make a quit attempt; 4, assist in quit attempt; and 5, arrange for follow-up. The training also includes a description of how to prescribe pharmacotherapy. Training increased knowledge of the relation between smoking and oral health, the use of the 5A model and prescribing. Although all actions increased, not all increased significantly. Havlicek concluded that involvement of the entire dental team is crucial for successful integration of tobacco cessation interventions within a clinical setting and that follow-up is important to keep professionals alert.

Secker-Walker trained dental professionals for one hour with supportive role playing. The training was found to change professionals' attitudes, they reported being more prepared to advise and counsel patients (Secker-Walker *et al.*, 2000).

One study used a different educational strategy. Houston developed an online education programme and informed professionals of updates by mail (Houston *et al.*, 2008). The professionals, themselves decided on the intensity of the training to be provided. There was a strong effect (i.e. 10% increase) on the delivery of smoking cessation advice to patients. However, the effects also waned to a significant extent over time. Houston thus suggested that encouragement over time is also needed to sustain the efforts of such professionals.

Three studies included an organisational support of a different kind. Havlicek found referring patients to a telephone-based tobacco cessation programme to be effective. Clearly defined roles for the dental team were also mentioned as critical for successful implementation of smoking cessation interventions in daily dental care. The dental practices were stimulated to advise or counsel patients using structured protocols which included the 5A model (Havlicek *et al.*, 2006). Such stimulation proved to be effective.

The professionals in the study by Secker-Walker were also given protocols and information for the referral of patients to stop smoking groups conducted in collaboration with other health care institutions. Secker-Walker found increased provision of cessation advice and referrals to smoking cessation groups by both dentists and dental hygienists (Secker-Walker *et al.*, 2000).

In the study by Houston, dental professionals were given internet-based support and feedback (Houston *et al.*, 2008). Continuous stimulation was needed to keep the professionals alert. Albert similarly found that frequent contact increased counselling behaviour (Albert *et al.*, 2004).

Only one study included financial support, reimbursing dentists for participation in the study, and a dental health organisation reimbursed dentists for smoking cessation encounters with their patients. The costs of such an intervention were considered acceptable (Albert *et al.*, 2004). Reimbursement increased the occurrence of cessation counselling.

As for other strategies, in two studies, namely those of Albert and Houston, patient education materials were placed in practices to provide patients with extra information (Albert *et al.*, 2004; Houston *et al.*, 2008) though the materials' effectiveness is not mentioned. Houston also introduced a website for the provision of information, the interactive training of smoking cessation counselling and/or advising and a possibility for the information exchange. The provision of such internet support proved to be effective although the effects were found to wane over time.

Turning to the effectiveness of support strategies aimed at both dental professionals and patients, 3 studies offered professional education (i.e., training) as part of their support strategy (Gordon and Severson, 2001; Gordon *et al.*, 2005; Little *et al.*, 2009; Severson *et al.*, 1998; Wood *et al.*, 1997). Severson did not report the effects of this training on either the counselling behaviour of dental professionals or the smoking cessation of patients (Severson *et al.*, 1998). Gordon, however, reported increased provision of smoking cessation advice and counselling as a result of training. In addition to training, materials with information on smoking cessation were also provided and found to stimulate the professionals address the tobacco use of patients and reduce the use of smokeless tobacco. Training in small groups ensured individual contact and included an explanation of the 5A model and reinforcement of new behavioural skills. A second stage included an hour at the practice to answer any questions, address specific problems and train new staff members (Gordon and Severson, 2001; Gordon *et al.*, 2005, 2006). In the third study, Little showed that specially trained professionals delivered more chair-side counselling. These professionals were trained to refer patients to external organisations, and dental hygienists adopted this approach more often than dentists.

Also in three studies, patient education was at least part of the support strategy adopted. In the study by Barnfather, patients were educated about the negative effects of smoking on oral health and given a literature package. The study could not demonstrate an association between increased patient knowledge and patient quit rates (Barnfather *et al.*, 2005). In the study by Gordon, patients were also offered educational materials. Significant differences in smoking cessation between the control and intervention groups were detected after both 3 and 6 months, but the direction of the association between the provision of materials and smoking cessation was unclear (Gordon and Severson, 2001; Gordon *et al.*, 2005, 2006). In the study by Little, patients were given an opportunity to talk to a health plan tobacco counsellor within the dental practice to learn more about the resources and options for cessation. Such referral was found to increase attention to smoking cessation within the dental practice.

On the organisational side, one study introduced the 5A model and other protocols into the dental office (Gordon and Severson, 2001; Gordon *et al.*, 2005, 2006). In addition, the dental professionals were encouraged to refer their patients to quit lines. Advice and counselling behaviour were found to increase as a result (Gordon and Severson, 2001; Gordon *et al.*, 2005, 2006).

In the study by Little, dental professionals were also stimulated to refer patients to telephone counsellors. The subsequent referral rates were found to differ significantly across the participating practices (Little *et al.*, 2009) with a team approach appearing to be influential.

A financial strategy was used in one study, Severson, with patients who responded to the questionnaire being entered in a \$100 monthly lottery (Severson *et al.*, 1998) though the effects on quit rates were not reported.

Other strategies included integrating salivary nicotine tests into individual's daily dental care and proved to be a very effective smoking cessation tool elevating quit rates by 17 % after a period of only 8 weeks (Barnfather *et al.*, 2005). However, the long term effects of such an intervention are unknown. It nevertheless appears to be the case that self-report measures of smoking may be more inconsistent and yield more unreliable data than an actual salivary nicotine test.

Gordon provided pharmacological support in the form of nicotine patches and gum, so increasing the incidence of not only smoking cessation but also the provision of smoking cessation advice and counselling. Whether or not these increases all are due to the supply of pharmacological support is unclear, however; it is probably the combination of various intervention elements which was successful (Gordon and Severson, 2001; Gordon *et al.*, 2005, 2006).

## Discussion

This review aimed to identify effective strategies for the support of dental professionals in the integration of smoking cessation advice and counselling into daily dental practice. We divided the strategies into professional directed and professional plus patient directed strategies. All the identified strategies involved a combination of elements and most of the relevant studies only described the general outcome and did not consider the contributions of the different strategy elements. Therefore it was difficult to identify

which elements were critical for changing professional attitudes and behaviour. Nevertheless, some indications of effective components were revealed.

On the basis of the present review, we identified that for strategies aimed at dental professionals and at both dental professionals and patients:

- combined interventions effectively stimulate not only the provision of smoking cessation advice and counselling but also actual smoking cessation
- most of the studies had professional education as a major component;
- education was found to support change in attitudes and increase knowledge regarding smoking and smoking cessation and to stimulate counselling behaviour
- organisational interventions such as structured protocols, involvement of the entire dental team, internet-delivered support and referral possibilities appeared to raise the provision of smoking cessation advice.

For support strategies aimed only at dental professionals: repeated attention to the professional's task of delivering smoking cessation advice and counselling appeared necessary to sustain behavioural change; and, the added contribution of reimbursement to the provision of smoking cessation advice remains unclear. For support strategies aimed at both dental professionals and patients: the incorporation of patient-oriented aids such as salivary nicotine tests and the provision of nicotine replacement therapy appeared to raise the provision of advice and smoking cessation outcomes.

Previous studies have already discussed the effectiveness of smoking cessation advice and/or counselling delivered in primary dental care (Carr and Ebbert, 2007). So instead, the present review was restricted to studying the effectiveness of implementation recommendations and strategies based on various tobacco addiction treatment guidelines. The present findings must be considered with caution as only 8 studies qualified for inclusion in the review and only 4 met the preset criteria for good quality. Considering the heterogeneity of the studies meta-analyses could not be performed.

Previous research mentions a lack of knowledge regarding the relationship between smoking and oral health on the one side and, on the other hand, suitable counselling techniques as barriers to the provision of smoking cessation advice (Chestnutt and Binnie, 1995). Our findings show combined smoking cessation intervention strategies enhance the provision of smoking cessation counselling and quit results. Education in combination with continuous support was found to be especially effective. Feedback loops aimed at patients, using nicotine tests or salivary tests, increase motivation in patients and professionals.

Support to dental professionals can be provided via face-to-face contact but also via the internet. It is important to stimulate professionals over time. The findings of the present review are in line with guidelines for the treatment of smoking addiction which recommend the incorporation of patient materials and the need to explicitly train dental professionals with regard to the provision of smoking cessation advice and support (Fiore *et al.*, 2000). However, it is still not clear which implementation components are of critical importance.

Further research is needed to explore the contribution of different components of support (e.g. organisational, education) to the efficacy of smoking cessation interventions in dental care. More randomised control trials in dental practice are needed to reach firmer conclusions.

We found only a few moderate-to-good quality studies. These studies used combined support strategies to stimulate dental professionals to implement smoking cessation activities in daily dental care. This made it difficult to draw conclusions about the effects of the individual strategy components. But education in combination with continuous support was found to be clearly effective. So dental professionals should be trained and given continuous support to remain alert and integrate new smoking cessation behaviour in their daily routines. Dental professionals can play a role in the counselling of patients to stop smoking, but ways to stimulate professional counselling behaviour should be explored further.

### Acknowledgment

A Pfizer independent grant financed this research.

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