

SMOKING CESSATION IN PERIODONTAL THERAPY

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ABSTRACT:

Smoking has been identified as a significant risk factor for periodontal disease initiation and progression and may influence the clinical outcome of periodontal therapy. Smoking cessation has been found to be beneficial to periodontal treatment outcomes and periodontal health. Smoking cessation strategies including behavioural therapy and pharmacotherapy may be integrated in existing procedures of dental treatment for achieving an improved outcome.

Key words: smoking; tobacco; smoking cessation; periodontal therapy; nicotine replacement therapy.



INTRODUCTION:

Smoking has been recognized as one of the major risk factors for an ever-increasing number of diseases and conditions including cancer, low birth weight, pulmonary, cardiovascular, and gastrointestinal diseases.^[1] Globally, tobacco use is related to more than 5 million deaths per year, and this number is expected to increase to 8 million deaths in 2030. Unfortunately, global tobacco consumption is increasing despite the overwhelming scientific evidence gathered in the past 50 years and all the initiatives designed to curb tobacco use. It has been estimated that more than one billion people smoke daily worldwide, with China, India, Indonesia, Russia, USA, Japan, Brazil, Bangladesh, Germany and Turkey accounting for more than two-thirds of the smokers in the world.^[2,3]

With respect to oral health, it has been shown that smoking is associated with an increased risk of oral cancer and premalignant lesions, caries, tooth loss and periodontal disease.^[3] Smoking increases the prevalence and severity of periodontal destruction.^[4] Cross-sectional studies have consistently demonstrated that smokers present with less gingival inflammation than non-smokers suggesting that smokers have a decreased expression of clinical inflammation in the presence of plaque accumulation compared with non-smokers.^[5-7] Multiple cross-sectional and longitudinal studies have demonstrated that pocket depth, attachment loss, and alveolar bone loss are more prevalent and severe in patients who smoke compared with non-smokers.^[8-10] Smoking is associated with a two- to eight-fold increased risk for periodontal attachment and / or bone loss, depending on the definition of disease severity and smoking dose.^[4, 11]

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Various factors contribute to the deleterious periodontal effects of smoking, including alterations in both microbial and host response factors. Systemic innate and immune responses are impacted by smoking, and tobacco components have toxic effects for local cell populations, and impact local host responses. Even though the precise mechanisms by which smoking exerts detrimental effects on the periodontium have not yet been clearly understood, proposed mechanisms for the negative periodontal effects of smoking include vascular alterations, altered neutrophil function, decreased IgG production, decreased lymphocyte proliferation, increased prevalence of periodontal pathogens, altered fibroblast attachment and function, difficulty in eliminating pathogens by mechanical therapy, and negative local effects on cytokine and growth factor production. [1,4,8,9]

Research studies have demonstrated that smoking has a negative adverse effect on the full spectrum of periodontal treatment approaches, ranging from mechanical debridement, local and systemic antimicrobial therapy, surgery, regenerative procedures and implants. [1, 8]

PATHOPHYSIOLOGY OF TOBACCO SMOKING

Hundreds of different compounds have been identified in tobacco smoke including nicotine, which appears to be responsible for the dependence that characterizes the smoking habit. [12] Nicotine is thought to interact with the mesocorticolimbic dopamine system in a manner similar to

that of other abused compounds like cocaine. [13] Ingestion of these compounds can cause euphoria, hallucinations, and/or sedation. Nicotine in low concentrations is a central nervous system (CNS) stimulant. [14] Cigarette smoking can send nicotine to the brain in as little as seven seconds. [15] The delivery of nicotine starts a series of biochemical reactions that activate the nicotinic acetylcholine receptors in the brain; which in turn induce dopamine release in the nucleus accumbens producing a sense of euphoria. [16] Nicotine has a half life of approximately two hours; at that point, dopamine levels drop and the craving for another cigarette resumes. [17]

Nicotine dependence is the chief reason that smokers might be unable to quit, as withdrawal can be associated with such characteristics as unpleasant moods and physical symptoms that are relieved by smoking. Addiction also depends on self-sustaining, self-reinforcing behavioural patterns. Behavioural and environmental triggers can start a neurophysiological response that leads to craving nicotine. [18]

EFFECTS OF SMOKING CESSATION ON PERIODONTAL STATUS AND TREATMENT OUTCOMES

Smoking cessation exerts beneficial effects on periodontal health and treatment outcomes. Smoking cessation cannot reverse the past effects of smoking; however, the rate of attachment loss and bone loss slows after patients quit smoking. [4, 19] Periodontal disease severity in former smokers falls between that of current and non-smokers. [4, 20]

Cross-sectional studies usually observed a lower occurrence of periodontitis among former smokers than among current smokers, and a time-dependent relationship seems to exist of a lower risk of periodontitis among subjects with longer periods of abstinence.^[3,21,22] Bolin et al,^[23] in a ten-year radiographic follow-up of alveolar bone loss, reported that progression of bone loss was significantly retarded in those who had given up smoking during the study, compared with those who continued to smoke. Preliminary evidence suggests that patients who quit smoking respond to both nonsurgical and surgical therapies in a similar way to individuals who have never smoked.^[24-26]

According to Borell and Papapanou, smoking cessation is key in the prevention and control of periodontal diseases because it affects both the bacterial and host etiological components in the disease process.^[27] Grossi et al,^[24] investigated the effect of cigarette smoking on patients' clinical and microbiological responses to mechanical therapy. Current smokers had less healing and reduction in subgingival *B. forsythus* and *P. gingivalis* after treatment compared with former and non-smokers. It was concluded that, since the healing and microbial responses of former smokers are comparable with those of nonsmokers, smoking cessation may restore the normal periodontal healing response.

Preshaw et al,^[28] conducted an intervention study, which investigated longitudinally, the effect of smoking cessation on nonsurgical periodontal treatment outcome for a period of 1 year in

smokers with chronic periodontitis. Those individuals who successfully quit smoking showed the best response to therapy and an improved microbial profile compared with individuals who continued to smoke. Morozumi et al,^[29] recently investigated the short-term effect of smoking cessation on periodontal tissue physiology and the host response in 16 smokers. The study demonstrated that gingival crevicular fluid and gingival blood flow increased after smoking cessation, possibly as a result of improvement in the gingival microcirculation, which could enhance gingival tissue metabolism and local immune responses and contribute to improvement in periodontal health.

Similarly, implant success rates for past smokers are similar to those for never smokers.^[30] It has been proposed that smoking cessation in the immediate surgical period is beneficial. The majority of implant failures occur prior to prosthesis delivery; therefore, smoking cessation during the healing phase should be beneficial.^[1] According to Bain, in a group of patients who quit smoking 1 week before and 8 weeks after implant placement, incidence of early implant failures was similar to that in nonsmokers.^[31] In a subsequent study, Peleg et al,^[32] reported that if smokers abstained from smoking 1 day before sinus augmentation and implant surgery and for 10 days afterward, complications were avoided.

SMOKING CESSATION IN DENTAL SETTING

Dentistry has a strong history of commitment to preventive education as a routine part of patient treatment. Dentists

and dental hygienists have training in patient education that can be applied easily to tobacco use intervention methodologies, and dental professionals understand the nature of behavioural changes as gradual and requiring constant reminders. The practice of periodontics offers multiple opportunities for interaction with patients: during active treatment and especially in the ongoing long-term maintenance phase of care. Because of the negative impact of tobacco use on periodontal treatment, an additional motivation for cessation can be demonstrated over time and used effectively to help patients ultimately achieve a tobacco-free life.^[1, 19]

Smokers who have been treated for periodontal diseases should be recalled more frequently for professional dental examination, reinforcement of oral hygiene instruction, intensive scaling, and prophylaxis after completion of treatment. Smoking is known to influence the composition of the subgingival microflora in adult patients with periodontitis, and the habit may predispose to the development of a specific population of periodontal pathogens. Therefore, whenever necessary, a combination of antibiotic therapy and participation in a smoking cessation programme may be the most effective treatment of smoking-induced periodontal diseases.^[19, 33]

SMOKING CESSATION STRATEGIES

Smoking is a chronic condition that requires long-term management. Smoking cessation or tobacco intervention strategies may be divided into two broad categories: behavioural therapy and pharmacotherapy.

In a dental setting, tobacco intervention program could be brief or comprehensive.^[1,19] The level of nicotine addiction, health status, training of the clinician, patient preferences and expense are all variables which affect selection of a particular intervention strategy.^[9]

A) Behavioural Therapy

i) 5 R's Motivational interview strategy

Motivational interviewing is described as the process of resolving ambivalence, using the patient's own reasons for concern and arguments for change. It involves creating a collaborative effort with the patient to overcome addictive behaviours.^[34]

5 R's strategy, available to dental practitioners, is based on five components as follows:^[35]

Relevance – Encourage the patient to indicate why quitting is personally relevant, being as specific as possible. Motivational information has the greatest impact if it is relevant to a patient's disease status or risk, family or social situation, health concerns, age, gender, and other important patient characteristics.

Risks – The clinician should ask the patient to identify potential negative consequences of tobacco use. The clinician may suggest and highlight those that seem most relevant to the patient.

Rewards – The clinician should ask the patient to identify potential benefits of stopping tobacco use. The clinician may suggest and highlight those that seem most relevant to the patient.

Roadblocks – The clinician should ask the patient to identify barriers or impediments to quitting and provide treatment that could address barriers.

Repetition – The motivational intervention should be repeated everytime an unmotivated patient visits the clinic setting. Tobacco users who have failed in previous quit attempts should be told that most people make repeated quit attempts before they are successful.

Particularly, four components of “relevance,” “risks,” “rewards,” and “repetition” in the motivational strategies include some issues specific to dental practice. Various oral symptoms and dental treatments relevant to smoking may be used to motivate dental patients. For example, periodontal patients need to know the risk posed by continuing smoking for the development of periodontal tissue breakdown, because these patients are susceptible to smoking-associated periodontal disease. In other words, the issue of smoking and periodontal disease is personally relevant. Therefore, smoking cessation is recommended for the substantial benefit on the outcome of periodontal treatment. Periodontal practitioners can repeat motivational interventions when unmotivated patients visit for periodontal treatments. Periodontal practitioners need to acquire new knowledge about only one technique among the motivational strategies—roadblocks.^[1, 35]

ii) Prochaska's Transtheoretical Model

The level of willingness to quit smoking varies among dental patients. Dental practitioners need to know the stages of behaviour change and approaches that can be used to promote progress through the stages of behaviour change.^[35] Prochaska's transtheoretical model is a comprehensive method for assessing willingness to quit using behavioral approaches which involve stage-based interventions. This model categorizes smokers into five different stages; precontemplation, contemplation, preparation, action, and maintenance.^[36, 37]

Precontemplation – patients who are not ready to quit in the next six months. Remind the patient that services are available when they are ready to use them.

Contemplation – patients who are ready to stop in the next six months, who have not attempted to stop in the last year. Offer them self-help material, refer them to other health professionals and an opportunity to discuss plans to quit, assistance planning or setting a quit date.

Preparation – patients who are ready to quit in the next month, who have made an attempt in the last year. Offer them self-help material, refer them to other health professionals and an opportunity to discuss plans to quit, assistance planning or setting a quit date.

Action – patients who are making a quit attempt. They can be provided with encouragement and information about relapse.

Maintenance – patients who are maintaining their quit attempts. They can

be provided with encouragement and information about relapse.

Individuals cycle through these stages and a relapse may be followed by beginning again at the precontemplation stage. The cycle through the stages above may be repeated at least two to three times. The concept of “decisional balance” includes an understanding of the reasons to smoke including pleasure, tension relief, and concentration, and the benefits of quitting including health, embarrassment to smoke, and social pressures to quit. Having self-insight into these reasons allows a person to strengthen the reasons to quit and to find other ways to meet the needs that stimulate their smoking.^[37]

Pallonen studied the applicability of the central concepts of the transtheoretical model with adolescents. The findings suggested that adolescents and adults exhibit similar behaviour at different stages of the smoking cessation process. It was found that adolescents, however, may progress through the stages very quickly and enter the action stage prematurely, which could make them poorly prepared for cessation. This study indicated that youth could benefit from a heavier emphasis on the first two stages of change.^[38]

iii) 5 A's Model

A useful model for tobacco intervention for dental practice is the ‘5 A's model’ developed by Fiore et al.^[35] This model consists of five components for effective smoking cessation intervention:^[1, 35]

Ask – systematically identifying the tobacco use

Advise - strongly advising all who use tobacco products to stop

Assess - evaluating the patient's willingness to quit

Assist - offering assistance in quitting; and

Arrange- following up on the patient's cessation efforts, especially early in the process.

The emphasis in this brief intervention is to offer information, encouragement, and support to patients, and to provide information about resources that may help the patient become tobacco free.^[1]

For Comprehensive Intervention Program, the scope of 5A's approach may be expanded as follows:^[1, 35]

Ask - Identification of the patient's tobacco use status (current, former, or never) is the first step in all interventions. The addition of tobacco use status to the traditional vital signs has been suggested as a way to initially assess and update this information, and a question regarding tobacco use should be a part of the health questionnaire used in the dental office. Once a patient is identified as a tobacco user, additional information on the patient's level of addiction is useful. The Fagerström test is easily administered and is commonly used to assess nicotine dependence levels. The Fagerström test is scored based on answers to questions about timing of the first cigarette smoked in the day, difficulty in not smoking in forbidden areas, most important

cigarette during the day, number of cigarettes smoked per day, timing of most intense smoking, and smoking when ill. Higher scores indicate more addicted smokers.

Advise - All oral health professionals should advise patients who smoke of the associations between their oral disease and smoking, and advise them that smoking cessation would be beneficial. A good time to discuss this is after the periodontal examination has been completed and during a review of the etiologic factors involved in periodontal diseases. Facts regarding the strength of smoking as a risk factor for disease, its impact on treatment, and the positive impact of cessation are statements that can be included in a manner that is informative and not judgmental. The patient's responses during this discussion will provide insight into their interest in cessation and level of readiness for cessation. In a study by Lung et al [39], it was found that only 6% of responding patients knew of an association with periodontitis.

Assess - The next step is to identify the patient's interest and readiness to attempt tobacco cessation. A model such as Prochaska's transtheoretical model (described above) for readiness to change is useful for evaluation of addictive behaviors, and is used frequently for tobacco cessation counseling.[37]

Assist - For any type of counselling that is performed with a nicotine-dependent patient, the most desirable techniques are those that are brief and non-judgmental. Motivational interviewing technique such

as 5 R's technique (described above) may be employed to help patients explore and resolve ambivalence about changing behaviours.[35] Another popular technique is hypnosis, which uses suggestion, focused attention, and the therapeutic relationship to attempt to alter the patient's behaviour. Meta-analysis of hypnosis in smoking cessation shows a treatment effect but no superiority over other behavioural techniques.[1] Overall, the use of behavioural techniques has been shown to have 2% to 14% effectiveness in cessation, defined as tobacco free for at least 6 months.[40] The best use of behavioural intervention might be in combination with pharmacological treatment.

Arrange - If the patient made a commitment to smoking cessation, follow-up from the office is critical. Methods of maintaining contact with the patient can range from appointments for office visits for monitoring and continued counselling, to letters or telephone calls confirming quit dates and encouraging follow-through with cessation. The most difficult time for patients is usually during the first week of cessation. Cessation rates have been found to be positively influenced by follow-up contact.

B) Pharmacotherapy

Numerous effective pharmacological approaches now exist for treating smoking addiction, as an adjunct to counselling. These therapies are divided into two categories, first-line and second-line.[36] First-line pharmacotherapies such as nicotine replacement therapy (NRT), sustained-release bupropion, or varenicline

should be recommended initially, as there is substantial evidence of their efficacy and there are fewer side effects than the second-line pharmacotherapies. Second-line pharmacotherapies include clonidine and nortriptyline. Other medications used to treat tobacco addiction include other anti-depressants, anxiolytics, mecamylamine, and silver acetate. Barring complications, all patients attempting cessation should be treated with at least one form of pharmacotherapy. In general, the addition of medication to behavioural therapy doubles cessation rates.^[1, 41]

A) Nicotine Replacement Therapy

Nicotine replacement products act as nicotine delivery systems in lieu of tobacco and can decrease withdrawal symptoms. The use of nicotine replacement products should be related to the patient's current nicotine exposure, and to past experiences with cessation. Nicotine chewing gum, lozenge, patch, nasal spray and inhaler are examples of NRT products available.^[1, 19]

The selection of the type of nicotine replacement should be individualized based on the patient's smoking habits and preferences. For patients who smoke a pack (20 cigarettes) or less a day, the patch is the most popular form of replacement. Nicotine patches provide a steady delivery of nicotine throughout the time that the patch is in contact with the skin. Some patients may experience sleep disturbances if they wear the patch at night, but those effects often disappear over time. Removing the patch at night is always an option. Nicotine patches come in several different dosages ranging from 7 to 22 mg.

After the patient has been smoke free for at least 4 weeks or longer, tapering to lesser-strength patches at 2-week intervals has been recommended.^[1]

Patients who smoke more than 20 cigarettes per day or who have had unsuccessful cessation attempts might benefit from a combination of nicotine replacement products to increase the blood levels of nicotine. Several combinations have been studied, but the usual recommendation is using the patch for constant nicotine blood levels, and adding one of the other products (gum, nasal spray, lozenge, or inhaler) as an addition for acute needs.^[42] While the patient is using nicotine replacement products, they should not use any other forms of tobacco. If the patient has not stopped using tobacco products while using nicotine replacement, the therapy should be stopped, and a new treatment plan formulated.^[1]

B) Bupropion

Bupropion is an antidepressant that acts on dopaminergic pathways in the central nervous system and the dopaminergic effect may contribute to controlling the symptoms of nicotine withdrawal during smoking cessation. Bupropion sustained release (SR) might help patients manage some associated symptoms of nicotine withdrawal such as anxiety and depression.^[16]

Although it is considered a first-line pharmacotherapy for smoking cessation and can be used alone, it is effective when used in combination with nicotine replacement products, and may be

particularly helpful with heavy smokers or smokers who have experienced multiple failed cessation attempts.^[1] Research studies have found that bupropion SR might be more effective than NRT for smoking cessation.^[43,44] The combination of bupropion with NRT via a transdermal system has the highest success rates of cessation treatments.^[19]

Bupropion use should be initiated at least 2 weeks prior to the patient's cessation date and subsequent initiation of nicotine replacement therapy, such as the patch. The length of treatment usually lasts for 7-12 weeks and maintenance treatment (if indicated) can take up to six months. Common side effects of bupropion SR include insomnia and dry mouth. All patients being treated with antidepressants should be monitored closely for unusual changes in behaviour during the first few months of drug therapy; these changes can include agitation, depression, suicidal ideation, and attempted suicide.^[45]

C) *Varenicline*

Varenicline is the latest drug approved for smoking cessation. It is a selective nicotinic receptor partial agonist. Because structure of varenicline is similar to that of nicotine, it binds to the nicotine receptor sites, preventing nicotine from doing so thereby reducing the pleasure of smoking and helps reduce withdrawal symptoms.^[16] Human trials showed varenicline to be effective for smoking cessation in approximately 44% of cases at 12 weeks, while bupropion SR was found to be effective in approximately 30% of cases.^[46]

Varenicline treatment starts one week before the quit date and continues for 12 weeks; maintenance treatment (if needed) may require up to six months. Common side effects include nausea, trouble sleeping, and abnormal or vivid dreams.^[47] Patients taking varenicline (especially patients with a history of psychiatric illness) should be monitored closely for any changes in mood and behaviour.^[16]

Success of smoking cessation using pharmacotherapy-based treatment can be more effective when accompanied by individual or group-based behavioural therapy programmes conducted by specialised counsellors. The most important factor for successful smoking cessation still lies on patients' willingness to quit smoking.^[19]

RELAPSE PREVENTION

Since nicotine dependence is chronic, the tendency for relapse is high. Instead of seeing relapse as failure, it can be viewed by the practitioner as an indication that alternate treatment approaches might be indicated, just as the treatment of particularly challenging periodontal conditions requires a treatment plan unique to the patient's circumstances.^[1] Smokers often experience several attempts at cessation before long-term abstinence is achieved and are more likely to have success when they have help with quitting.^[48] All former tobacco users in the practice should be regularly encouraged to remain abstinent. For patients who have recently quit, discussions should include the benefits of cessation, the successes they have had, and problems they have

encountered. Scheduling follow-up visits, sending notes, and making telephone calls of support are all examples of activities that can help patients remain abstinent.^[1, 16]

CONCLUSION:

Dental professionals are well positioned to provide smoking cessation advice to their patients because patients are likely to visit their dentist more often than their physician. When considering the

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