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The tobacco-using periodontal patient: The role of the dental practitioner in tobacco cessation and periodontal diseases management

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Abstract

Although the prevalence of tobacco use has declined in some parts of the world, tobacco use remains a persistent and, in some cases, growing problem that will continue to be a fundamental challenge facing dental practitioners in the decades ahead. The dental practitioner has a unique opportunity and professional obligation to be a positive influence in reducing the economic and social burden inflicted by tobacco use on dental and general health. In this article, the current non-invasive, evidence-based approaches are presented for the dental practitioner to help patients avoid tobacco initiation, to encourage and assist patients' in tobacco cessation, and to address tobacco-induced damage to periodontal supporting tissues.

Introduction

It is well known from epidemiological studies that the use of tobacco products in general, and smoking products in particular, is the major preventable risk factor in the initiation and progression of periodontal diseases (50, 72, 97). Furthermore, tobacco use has been shown to have major adverse effects on the full range of both non-invasive and surgical periodontal procedures (63, 72, 82, 97). In most high-income countries, the prevalence of the use of tobacco products, particularly cigarette, cigar, and pipe smoking, has declined in recent decades (20), due in part to comprehensive tobacco control efforts, including public education programs and government regulation and taxation. During this same period, in some of these high-income countries, such as the United States, the prevalence and severity of periodontal diseases has sharply declined, including when taking into account changing definitions of periodontitis across surveys (32). The declining prevalence of periodontal diseases and concomitant downtrend in use of tobacco products has led some investigators to propose that the United States had endured a "hidden epidemic" of tobacco-related periodontitis during the first half of the 20th century (67). Despite recent reductions, however, the prevalence of tobacco use remains elevated in many high-income countries (95). In many low- and middle-income countries, notably in Africa and the eastern Mediterranean, tobacco use is expected to rise (20). Overall, the number of tobacco smokers worldwide will reach an estimated 1.1 billion by 2025 (20). In addition, the use of smokeless

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tobacco as a possible substitute for smoked tobacco products remains an area of controversy and public health debate (48, 85). Likewise, the recent introduction and growing popularity of electronic cigarettes presents new questions related to potential effects on periodontal and general health.

Both the general practitioner and the periodontal specialist will encounter tobacco users more frequently among their patients than in the general population (50). Given both the major public health and patient-centered benefits of tobacco cessation, and considering the opportunity for frequent patient interaction in a dental clinical setting, the dental practitioner is uniquely positioned to educate and motivate patients to initiate and continue a tobacco cessation program (4, 54, 70). However, dentists, in general, have not widely embraced tobacco cessation in practice (53). In actuality, current adult smokers are far less likely to receive advice to quit when visiting a dentist than a physician (2). With this potential opportunity for dental practitioners to play a greater role in tobacco cessation in mind, this paper will present the current knowledge of the effects of use of tobacco products on the periodontal tissues and response to periodontal therapy, and will review strategies for the practitioner to engage patients in tobacco cessation and to manage periodontal diseases in the tobacco-using patient.

Tobacco is a major risk factor for periodontal diseases and adverse treatment outcomes

Before extensive epidemiologic studies clearly established and quantified a relationship between tobacco use and periodontal diseases, it was commonly accepted among dental practitioners that smoking and periodontal diseases were related. Some of the classic periodontal texts and early publications (9, 10, 52) reported that smoking patients appeared to have more bone loss, deeper probing depths, perhaps less overt clinical signs of inflammation, and did not respond to periodontal treatment as reliably as non-smoking patients.

Published epidemiological evidence linking tobacco smoking and periodontal diseases did not emerge until the mid-20th century. However, in a 1947 study showing an increasing prevalence of ulceromembranous ginigivitis with greater levels of cigarette consumption, Pindborg (105) noted that an association between smoking and severe gingivitis had been suggested nearly 100 years earlier (15). Over the decades to follow, multiple studies confirmed higher prevalence of ulcerative gingivitis (84, 104, 120) and loss of alveolar bone or epithelial attachment among smokers (9, 26, 121, 119, 125). Yet, there was debate in the literature whether these associations were due to negative health effects of smoking itself or were a secondary consequence of greater amounts of plaque and calculus that had been observed in smokers (26, 106, 107, 119). Since then, a consistently strong relationship between clinical periodontal disease indicators and smoking has been demonstrated in large, national surveys worldwide (41, 43, 62, 69, 128) and has persisted when measures of plaque and oral hygiene are taken into account (16, 18, 28, 33, 60, 69). Longitudinal studies in a variety of settings clearly demonstrate that patients who smoke, even those with comparable

oral hygiene measures to non-smokers, lose more periodontal support (17, 22, 61, 127) and are more susceptible to tooth loss over time (39, 79).

As it became evident that adverse periodontal conditions observed in smoking patients were not merely a result of inadequate oral hygiene practices and subsequent plaque accumulation, investigations into other possible underlying causes, such as the influence of smoking on the composition of the microflora of the plaque biofilm, changes in the inflammatory or immune response, or changes in the healing capacity of the periodontal tissues increasingly became topics of investigation. While a full discussion of each of these areas would require a separate paper, a summary of these findings follows:

1. Several studies report a similar microbial profile of dental plaque in smokers when compared to non-smokers with regard to the ability to detect suspected periodontal pathogens in the subgingival plaque biofilm (8, 24, 35). However, in smokers, such suspected periodontal pathogens are recovered in shallower areas without clinical periodontal breakdown (42). More recent studies that utilize molecular techniques capable of characterizing previously unknown or difficult to culture bacteria have provided evidence of distinct microbial profiles and patterns of biofilm colonization in smokers and non-smokers (81, 118). The impact of tobacco use on the oral micobiome remains an active area of research.

2. Tobacco smoke itself appears to alter the protective host response and destructive inflammatory response to the plaque biofilm (12, 73, 101). These effects include impairment of most components of the protective responses to pathogenic microbiota, including the initial innate immune responses, neutrophil responses, antibody responses and cellular immune responses. In addition, and of equal or greater importance, are the effects of tobacco smoke on stimulating the activity and secretion of destructive inflammatory cytokines and enzymes. These two effects from exposure to tobacco smoke tilt the balance within the periodontal tissues to a greater tendency for periodontal tissue breakdown.

3. Tobacco products have been shown to impair the reparative abilities of the cells of the periodontium, such as fibroblasts, osteoblasts and cementoblasts, which are responsible for the formation of new cementum, connective tissue, and bone, which are essential for a favorable response to treatment (76, 101, 111, 122).

Through these mechanisms, tobacco use in general, and smoking in particular, leads to a greater incidence and severity of periodontal diseases and adverse periodontal treatment outcomes. A large body of published evidence reports the adverse effects of tobacco use on the clinical response to the full range of non-invasive and surgical approaches to periodontal treatment (3, 34, 59, 63, 78, 82, 114). These include non-surgical debridement (34, 59, 114, 129), open surgical debridement (3, 78), bone grafts (74, 83), guided tissue regeneration (25, 103), implant placement (31), implant survival in sites treated by bone augmentation procedures (124) and periodontal plastic surgery (7).

As most of these studies have focused on the effects of cigarette smoking, one question that may arise is whether use of alternative tobacco products, such as cigars, pipes, smokeless

tobacco, and electronic cigarettes, convey similar risks to the periodontium. To briefly summarize what is known about these products and their effects on the periodontal tissues:

1. Cigar and pipe smoking: While there have been fewer publications related to periodontal disease and alternative smoked tobacco products, those studies demonstrate that pipe and cigar smoking carries similar adverse risks for periodontal disease and tooth loss as do cigarettes (5, 79). Hookah, a form of tobacco water pipe smoking, also appears to be associated with impaired periodontal health (94). In addition, it is well established that cigar and pipe smoking, like cigarette smoking, increases the risk of developing other oral and systemic conditions, such as cancer (116).

2. Smokeless tobacco products: Studies have observed marked loss of the periodontal attachment near the area where the smokeless tobacco products are placed in the mouth (113), as well as a greater overall prevalence of severe active periodontal disease among smokeless tobacco users (47). In addition to periodontal effects, smokeless tobacco use is associated with greater risk of oral, esophageal, and pancreatic cancer (6, 21), as well as dental erosion, gingival recession, and oral soft tissue lesions (44,56, 99).

3. Electronic Cigarettes: Electronic cigarettes are devices that deliver an inhalable mix of nicotine and other substances as a heated aerosol, commonly referred to as “vapor,” but without tobacco combustion (55). In a short time, there has been rapid evolution in electronic cigarette product design and widening public awareness and product initiation (90). Despite extensive marketing of electronic cigarettes as a less harmful alternative to conventional cigarettes (38), the health implications of extended use remain unexamined. It is possible that electronic cigarettes could mitigate poor outcomes in nicotine addicted periodontal patients through avoidance of local and systemic effects of the thousands of toxic components of cigarette smoke. However, the health effects of the particulates and other compounds that are contained in electronic cigarette aerosols are not known (49). It is plausible that electronic cigarette use could harm the periodontium due to the known adverse effects of nicotine on periodontal tissues and the immune response (36, 134). Likewise, it is unknown whether electronic cigarettes will prove useful as smoking cessation devices, or whether youth initiation will contribute to a new generation of tobacco consumers. Public Health England recently commissioned a report stating that the use of electronic cigarettes is “around 95% safer than smoking,” (91), but that report was also criticized for basing its findings on “flimsy” evidence, including work with known conflicts of interest (126). Much needed investigations regarding the long-term oral health and public health implications of electronic cigarettes are underway.

Benefits of Smoking Cessation on the Periodontium and Periodontal Treatment Outcomes

In the previous section, the detrimental effects of tobacco use on the incidence, severity, and progression of periodontal diseases, as well as the negative effects on periodontal treatment

outcomes were presented. A central question is: Are there significant short-term and long-term benefits of cessation of tobacco use? Over the past several decades, several lines of evidence clearly indicate the beneficial effects of tobacco cessation on the periodontal tissues, progression of periodontal disease and periodontal therapy outcomes.

One line of evidence comes from cross-sectional studies, which compare the periodontal condition between groups of current smokers, former smokers and non-smokers. The findings from these studies clearly demonstrate that smokers have a higher proportion of sites with deeper probing depths and clinical attachment loss when compared to non-smokers (43, 60, 88). However, former smokers present with levels of probing depths, clinical attachment loss and alveolar bone loss that fall between the clinical values reported in smokers and non-smokers (41, 43, 128). These finding imply that in the former smoker, there may be a slowing of the rate of periodontal breakdown or perhaps even some repair and regeneration of the periodontal tissues following tobacco cessation.

A second line of evidence for the benefits of tobacco cessation draws from longitudinal studies of current smokers, former smokers, and non-smokers. These studies demonstrate that the rate of progression of periodontal breakdown over observation periods of multiple years, as measured by probing depths, attachment loss, or alveolar bone levels, is similar between former smokers and non-smokers, and significantly lower in both of these groups than the disease progression observed in current smokers who continue to smoke (17, 51 127). In addition, the risk of tooth loss in former smokers approaches the lower risk of tooth loss observed in non-smokers as the length of time since quitting tobacco increases (40, 80).

A third line of evidence on the benefits of smoking cessation derives from studies that focus on the clinical response to specific periodontal therapies between current smokers, former smokers, and non-smokers. These published studies have reported on clinical improvement following the basic non-invasive periodontal procedures such as supra- and subgingival debridement (59, 86, 114), as well as more advanced surgical periodontal procedures such as open flap debridement (23), grafting and regenerative procedures, periodontal plastic surgery, and implant site preparation and placement (11). While numerous studies have demonstrated clinically measurable worse healing responses to the full range of periodontal procedures in current smokers as compared to non-smokers, most studies suggest that the healing responses in former smokers are comparable to non-smokers.

While the detrimental effects of tobacco use and the potential benefits of tobacco cessation are well established and can serve as motivational tools for the dental practitioner in advising and motivating patients, one common question raised by the smoking patient is whether reducing the amount of tobacco used (in particular, number of cigarettes smoked per day) rather than quitting altogether may convey some benefits. Some published cross-sectional studies report a dose-dependent association between tobacco use and periodontal disease status, with disease severity increasing with a greater number of cigarettes smoked per day (28, 88, 128). Similarly, more pack-years of cigarette smoking (packs per day X years smoked) have been associated with a worse periodontal condition (130, 62). However, as will be further discussed in the following sections, cutting back on the levels of smoking, for example by reducing the number of cigarettes smoked per day, may be of questionable

benefit. In some studies, moderate and heavy smokers presented with comparable periodontal disease severity (41, 69). When the number of cigarettes consumed daily is reduced, levels of nicotine and other tobacco substances in the bloodstream and urine are not necessarily reduced proportionately (14, 64). This may be due to the need for the smoking patient to maintain the same high habitual levels of nicotine and thus to compensate by smoking each cigarette more intensely (14). Thus, the overall goal of addressing the problem of tobacco use and periodontal disease should not be a reduction in tobacco use, but an effective long-term tobacco cessation program.

Keeping these considerations in mind, the dental practitioner may be in a unique position to help their patients in a smoking cessation program. In particular, some patients may visit their dentist on a more regular maintenance or recall interval and therefore have the opportunity to receive repeated educational and personal demonstrations of the effects of tobacco use on their oral health, as well as instruction, feedback, and reinforcement in a tobacco cessation program. The dental practitioner may thus be able to employ one or more of the following three strategies:

1. Keeping their patients from initiating use of tobacco products
2. Helping patients to quit through a sustained tobacco cessation program that can be initiated in the clinical setting
3. Addressing the damage to the periodontal support and reducing further damage from tobacco use for those patients, where long-term tobacco cessation has yet to be achieved

In the following sections, each of these strategies will be discussed from the perspective of what the dental practitioner can do through non-invasive approaches.

Keeping patients from starting a tobacco habit

Patients as well as the general public have frequent contact with the dental practitioner as a key health care provider. These contacts include regular recall visits, visits for the full range of dental treatments, as well as contact with dental professionals in the community through outreach programs in schools, public health fairs, media appearances, and other events. Thus, the dental practitioner can play a major educational role in both the community and clinical practice in promoting tobacco cessation and in discouraging tobacco initiation. Both one-on-one interactions as well as more general educational programs can utilize information on the harmful effects of tobacco and the benefits of tobacco cessation as were discussed in the previous sections.

However, it should be kept in mind that throughout most of the 20th century and into the 21st century, the public has been exposed to highly effective campaigns by the tobacco industry to promote tobacco use in various forms. These include advertisements and other promotions, which target women, minorities, and young non-smokers (37, 68, 87,93). Targeting young non-smokers is of particular concern, as cessation success among tobacco users who initiate use at adolescence is much lower than those who take up a tobacco habit later in life (27, 89). This is due in larger part to the habituating effects of nicotine.

Nevertheless, the dental practitioner can play an active role in public health campaigns to educate the public and to support funding for tobacco cessation education programs. In addition, taxes on tobacco products have been shown to be effective in reducing cigarette use (92), especially when tax revenue is directed to additional tobacco control programs (30). For example, in the United States, those states that impose high taxes on tobacco products and use a portion of this tax revenue for education and tobacco cessation programs have significantly lower smoking prevalence than those states without these funded programs from tobacco tax revenue (57).

While declines in tobacco use across many parts of the world are an encouraging trend, high levels of tobacco use remain a pressing public health epidemic, especially in lower- and middle-income countries and in countries with minimal to no funding for tobacco education programs (20). In several countries, tobacco use remains elevated even among health professionals, and consultation with patients regarding tobacco use is not standard practice (1). Dental practitioners in all countries can play an instrumental role in tobacco control through direct patient education, and discouraging the use of tobacco products among patients of all ages, particularly young, non-smokers. Moreover, dentists and dental hygienists can encourage their professional societies to utilize their political influence and push for effective tobacco control policies that will improve the oral health of dental patients on a wider scale.

Helping patients to quit

Dental practitioners are well positioned to provide tobacco education and cessation counseling to their patients (4, 54, 70, 110). It is recommended practice to identify past and present tobacco use systematically and at every patient care appointment (45). Nearly 70% of smokers desire to quit, and approximately half will try to quit within a one-year period (29, 131), which means that dental practitioners have an opportunity to intervene with those patients who are willing to quit. Furthermore, another study reported that given the opportunity, smokers would prefer smoking cessation counseling from a health professional over support groups, how-to kits, and telephone counseling (100). Brief counseling interventions during routine office visits by physicians and other health professionals, including dental practitioners, can achieve long-term cessation success of approximately 16%–20% (45). Success is most likely when counseling and pharmacological approaches, such as nicotine replacement therapies, are used in combination (45, 123). Fortunately, over the past several decades, a variety of behavioral and pharmacological strategies have been developed that can be employed by general dental practitioners, hygienists, and specialists to help their patients to quit. A comprehensive review of the tobacco cessation strategies developed in the U.S. and abroad would require a separate paper to describe each in detail. Therefore, this section aims to provide a brief description of intervention strategies and resources as a starting place to aid dental practitioners in developing tobacco cessation strategies for their patients.

The U.S. Public Health Service-sponsored clinical practice guideline *Treating Tobacco Use and Dependence* (45, 46) provides evidence-based practical methods for health professionals to incorporate into clinical practice. A recommended general framework is the “Five A’s

Approach" (Table 1), consisting of *asking* clients about tobacco use, *advising* users to quit and encouraging nonusers to remain tobacco free, *assessing* readiness to quit, *assisting* with the quitting process, and *arranging* follow-up (46, 133).

Assessing a patient's willingness to quit is one of the most important steps in the Five A's approach. If a patient has expressed a sincere interest in quitting, the chances for success are far greater than if the patient is unwilling to quit or wishes to postpone the start of a cessation program. For these patients, before deciding whether to proceed with a smoking cessation program, a "Five R's" approach (45) has been developed (Table 2). Such an approach can enhance receptivity among patients for beginning an active tobacco cessation program at a future date.

It is also important for dental practitioners to arrange follow-up appointments with patients to reinforce the importance of tobacco cessation, especially among those patients attempting to quit. Multiple sessions of counseling have been shown to be more effective in achieving long-term cessation success than a single counseling session alone, with the chance of cessation success increasing with the number of sessions completed, as well as with the amount of time dedicated to each patient (46).

The major roadblock to achieving long-term tobacco cessation is the addictive nature of tobacco products in general, and nicotine in particular. As summarized in Table 3, nicotine can mimic the physiological effects of other natural and pharmacological agents (13, 71). In addition, with continuous exposure to nicotine, the brain begins to develop more nicotine receptors. Through this process, the body develops a tolerance to the effects of nicotine and requires more nicotine to reach similar pleasurable feelings. The increased number of nicotine receptors in tobacco users often requires a long period of time to return to the levels of non-users once cessation occurs (14).

Several pharmacological medications are available for tobacco cessation and can be used in combination with personalized tobacco cessation counseling. Depending on local regulations, these products can be available over the counter or can be prescribed. Foremost among these are nicotine replacement therapies (NRT), which contain nicotine and are available in the form of transdermal patches, chewing gum, lozenges, nasal spray, and inhalers (46). In addition, drugs with a nicotine agonist-like activity such as varenicline (Chantix) are now widely used. Buproprion SR (Zyban), a sustained release antidepressant has also been shown to be effective in smoking cessation, especially in combination with NRTs (75). However, contraindications and potential adverse psychological effects of buproprion SR should be considered before prescribing to each patient.

Even when aided by pharmacological agents, tobacco cessation can be extremely challenging, and most attempts are not successful. Therefore, the dental practitioner should be prepared to offer ongoing encouragement and reassurance for the patient undergoing a cessation attempt. One possible approach to counseling can be aimed at addressing nicotine withdrawal and relapse. This would involve informing the patient of the symptoms of nicotine withdrawal they could experience during the first days of tobacco cessation, which include depression, insomnia, irritability, frustration, anger, difficulty concentrating,

restlessness, increased appetite, weight gain, decreased heart rate, and general cravings (66). The dental practitioner can assure the patient that most of these symptoms peak 2–48 hours after quitting and subside within 2–4 weeks (65). A second counseling strategy for long-term cessation is to remind the patient of the short-term and long-term benefits of smoking cessation (131) as a motivational aid (Table 4).

One final strategy available to the dental practitioner may be to bring into focus identifiable smoking-related dental consequences that the patient may have already experienced as an additional a source of motivation to quit. Some evidence suggests smokers who have already experienced a serious health event for which tobacco use is a clearly demonstrated risk factor may have much higher cessation success than the general smoking population. For example, a smoking cessation intervention delivered by cardiac care nurses to patients who had been hospitalized for coronary heart disease resulted in 12-month tobacco abstinence in more than half of the participants (109). Analogously, for the tobacco-using dental patient, the dental practitioner can point to gingival recession, bone loss, and tobacco stains on teeth to demonstrate visually the detrimental effects of smoking on the dentition. Particularly for patients concerned about their general aesthetic appearance, such a demonstration might catalyze further effort from the patient to quit tobacco use for good.

Controlling the Damage

From the previous discussion of cessation strategies, it is clear that the dental practitioner is in a unique position to initiate, support, and encourage patients in tobacco cessation over a sustained period of time. Nevertheless, it is evident that for a significant portion of tobacco-using patients, some will choose not to attempt to quit tobacco use, while others may abstain from tobacco use for several weeks or months but then relapse, despite being highly motivated to quit. For this significant portion of the patient population, the dental practitioner must attempt to mitigate the inflammatory, destructive effects of tobacco use. At present there are two broad approaches for the practitioner.

The primary approach is to reduce or remove the etiologies of periodontal disease as part of initial therapy. This necessarily entails the mechanical removal of plaque biofilms and calculus through initial debridement in a clinical setting couple with consistent in-home plaque control by the patient to prevent accumulation of new microbial deposits. A secondary approach to control the periodontal damage from tobacco use is to lessen the local destructive inflammatory reaction to plaque accumulation that is enhanced in smoking patients. Host modulation therapies may be of benefit in reducing the damage from tobacco use. Such therapies can involve: a.) The systemic or local use of agents that can reduce the secretion of destructive inflammatory cytokines such as IL-1 beta and TNF alpha, which are elevated both locally and systemically in response to the plaque biofilm (12, 77, 132), b.) Agents that reduce the activity of enzymes that can break down the periodontal support, such as collagenase and other matrix metalloproteinases, and products of the oxidative burst, such as superoxide and hydrogen peroxide (19, 108), or c.) Agents that promote the resolution of inflammation itself (117).

One widely investigated host modulation approach is the systemic or local use of antibiotics in the tetracycline family, including tetracycline, doxycycline, and minocycline (112, 115). These antibiotics can inhibit anti-inflammatory pathways. Such therapies can be administered locally in periodontal pockets, where they also have antimicrobial effects at high doses over short periods of time (7–14 days). Lower doses of doxycycline can be administered by the patient systemically and daily, which no marked antimicrobial activity over longer periods (3–12 months). As a host modulation therapy for smokers, several studies have demonstrated that the local or systemic application of these tetracycline family antibiotics reduces the destructive inflammatory effects of smoking and augments the healing response in patients who receive some form of periodontal debridement (58, 98, 102, 114). However, not all studies have shown positive effects (96). While such host modulation therapies may improve treatment outcomes and might slow the progression of periodontal diseases in tobacco users, this approach should not be considered a substitute for tobacco cessation counseling.

Conclusions

Tobacco use causes extensive damage to the periodontium, both through contributing to the etiology of periodontal diseases and through impairing periodontal healing following clinical disease management. Although the prevalence of tobacco use has declined in some parts of the world, tobacco use remains a persistent and, in some cases, growing problem that will continue to be a fundamental challenge facing dental practitioners in the decades ahead. The dental practitioner has a unique opportunity and professional obligation to be a positive influence in reducing the economic and social burden inflicted by tobacco use on dental and general health. Utilizing non-invasive, evidence-based approaches, the dental practitioner is well posited to help patients avoid tobacco initiation, to encourage and assist patients' in tobacco cessation, and to address tobacco-induced damage to periodontal supporting tissues.

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Table 1

The Five A's Approach to Tobacco Cessation

Approach	Suggested Actions or Patient Dialog
ASK Tobacco use: Include current and former use Include non-cigarette products Document in patient chart	"Do you ever smoke or use any other type of tobacco, including smokeless tobacco and cigars?" "I take the time to ask all of our patients about tobacco use, because it is important."
ADVISE Give clear, strong, non-judgmental, and personalized advice to quit Connect advice with oral findings	"There have been some tissue changes in your mouth and gums since your last visit. Tobacco use is affecting your health." "The best thing that I can do for your current and future health is to advise you to stop smoking."
ASSESS How willing is the patient to make a quit attempt? If motivated: Help the patient create a quit plan If not motivated: Enhance the patient's motivation to quit	"Would you like to try to quit tobacco in the next month (or year)? If so, we can help."
ASSIST Help create a quit plan, involving: Set a quit date within two weeks Review past quit attempts Avoid other tobacco users Tell family and friends Remove tobacco from home, work, and car Avoid alcohol Recommend or prescribe pharmacotherapy Enhance motivation to quit using the 5 R's (Table 2)	*For patients who are ready to quit:* "Would you like to create a quit plan with me today?" *For patients who are not ready to quit:* Provide a brief intervention or a motivational interview using the 5 R's approach (Table 2).
ARRANGE *For patients not ready to quit:* Document in chart Follow-up at the next appointment *For patients ready to quit:* Refer to toll-free quit line, tobacco counselor, or local community-based tobacco cessation programs Document in chart Coordinate with other providers (e.g. patient's physician) to re-enforce the quit plan Schedule a follow-up appointment to review progress and provide additional counseling	*For patients not ready to quit:* "If it is okay with you, I'd like to check in with you at your next appointment to see where you are in your decision making." *For patients who are ready to quit:* *"If it's okay with you, I'd like to schedule a follow-up appointment or phone call to discuss your progress"*

* Modified from American Dental Association reference card for dental professionals. Available at http://www.ada.org/en/member-center/oral-health-topics/smoking-and-tobacco-cessation

Table 2

The Five R's Approach to Tobacco Cessation

Approach	Suggested Actions and/or Language
RELEVANCE Encourage patient to indicate why quitting is personally relevant	"Why is quitting tobacco something that matters to you?"
RISKS Ask the patient to identify potential negative consequences of tobacco use	"What do you think are some of the consequences of using tobacco?"
REWARDS Ask the patient to identify potential benefits of stopping tobacco use	"What do you think are the best things that will come from quitting tobacco?"
ROADBLOCKS Ask the patient to identify barriers or impediments to quitting	"What do you think are some of the things preventing you from quitting tobacco?" "Can you think of any ways to get around these barriers?"
REPETITION The motivational intervention should be repeated every time an unmotivated patient has an interaction with a dental practitioner. Tobacco users who have failed in previous quit attempts should be encouraged to continue trying to quit and be reminded that repeated attempts are often necessary	"Quitting is hard, but it can be done. Most people make multiple quit attempts before they are finally successful."

* Modif ed from American Dental Association reference card for dental professionals. Available at http://www.ada.org/en/member-center/oral-health-topics/smoking-and-tobacco-cessation

Table 3

Natural and pharmacological agents released by the body after exposure to nicotine

Agent	Physiological Effect
Dopamine	Pleasure sensation
Serotonin	Anti-depressant
Beta endorphin	Reduces anxiety
Acetylcholine	Enhances cognitive ability
Vasopressin	Enhances short term memory
Norepinephrine	Suppresses appetite

Sources: Benowitz, 99 (13) and Jiloha, 2010 (71)

Table 4

Short and Long Term Benefits of Tobacco Smoking Cessation

Short-Term Benefits
24 hours after quitting: chance of a heart attack decreases
48 hours after quitting: ability to smell and taste is enhanced
2 weeks to 3 months after quitting: circulation improves, walking becomes easier, and lung function improves
Long-Term Benefits
1 year after quitting: excess risk of coronary heart disease is halved
5 years after quitting: stroke risk reduces to that of a never-smoker
10 years after quitting: lung cancer risk is halved
15 years after quitting: risk of coronary heart disease and death is similar to that of a never-smoker

Source: United States Department of Health and Human Services. The health benefits of smoking cessation (131).