Tobacco’s Oral Health Effects

Home Study Course #50071

Dynamic Dental Educators designates this activity for 3 continuing education credits

This activity has been planned and implemented in accordance with the standards of the Academy of General Dentistry Program Approval for Continuing Education (PACE) through the joint program provider approval of Dynamic Dental Educators and Relias Learning. Dynamic Dental Educators is approved for awarding FAGD/MAGD credit. Approval does not imply acceptance by a state or provincial board of dentistry or AGD endorsement, 11/01/2013 to 7/31/2018, Provider ID #300115.

The Dental courses are accepted/approved in the following states: AL, AK, AZ, AR, CA, CT, DE, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV. For Florida and California, DDE is an approved provider (Florida Board of Dentistry Approved Provider #50-557; Dental Board of California Registered Provider #3964.)

Dynamic Dental Educators is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the provider or to ADA CERP at www.ada.org/goto/cerp.

This continuing education activity has been planned and implemented in accordance with the standards of the ADA Continuing Education Recognition Program (ADA CERP) through joint efforts between Dynamic Dental Educators and Relias Learning.

For assistance, please contact:
Relias Learning @ 800-950-4248

Copyright 2003 Dynamic Dental Educators. All Rights Reserved. No portion of this text may be copied, reproduced or used in any way without the written permission of Dynamic Dental Educators.

Our course content is unbiased and free from commercial influence. Everyone involved with the development of this course have no conflict of interest and have no financial relationships with the content of this course. Our home study continuing education courses are only meant for re-licensing purposes. Limited information is provided as an overview of the subject matter and potential risks exist when attempting to incorporate techniques or procedures using limited knowledge and without supervised clinical experience. This course is not intended to be a comprehensive or authoritative source.
<table>
<thead>
<tr>
<th>Objectives</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Tobacco Smoking</td>
<td>4</td>
</tr>
<tr>
<td>Smokeless Tobacco</td>
<td>5</td>
</tr>
<tr>
<td>Periodontal Disease</td>
<td>5</td>
</tr>
<tr>
<td>Dental Caries</td>
<td>8</td>
</tr>
<tr>
<td>Oral Cancer</td>
<td>8</td>
</tr>
<tr>
<td>Tobacco Affects Dental Development</td>
<td>10</td>
</tr>
<tr>
<td>Tobacco Affects Menopause and Osteoporosis</td>
<td>12</td>
</tr>
<tr>
<td>Reducing Tobacco Use</td>
<td>13</td>
</tr>
<tr>
<td>Smoking Cessation Therapy</td>
<td>14</td>
</tr>
<tr>
<td>Electronic Cigarettes</td>
<td>16</td>
</tr>
<tr>
<td>Smoking Cessation Resources</td>
<td>17</td>
</tr>
<tr>
<td>Conclusion</td>
<td>18</td>
</tr>
<tr>
<td>References</td>
<td>19</td>
</tr>
</tbody>
</table>
Objectives

- Differentiate among the various types of tobacco products and the subsequent risk each type imposes.
- Identify the reasons why cigarettes and smokeless tobacco are the prime risk factors for oral cancer.
- Determine why smokeless tobacco users have a high risk of dental caries.
- Explain tobacco's added risk factors for periodontal disease.
- Recognize the possible effects of maternal smoking on fetal development.
- Understand the risks of environmental tobacco smoke on nonsmokers and children.
- Determine a guideline for assessing tobacco users’ readiness to quit.
- Review tobacco cessation therapy.
Introduction

Whether inhaled or chewed, tobacco use adversely affects oral health. Smoking causes oral cancer, periodontal disease, bad breath and stained teeth and tongue. It delays healing after a tooth extraction and other oral treatments, making smokers poor candidates for any type of necessary or aesthetic surgery. Smokeless tobacco contains a significant amount of sugar and grit, which encourages tooth decay. Its use also leads to the formation of malignant oral lesions.

Tobacco use impacts reproductive and fetal health. Chemicals in tobacco smoke, such as tar, carbon monoxide, oxidative chemicals, radioactive compounds and hydrogen cyanide, damage fallopian tubes, the DNA in eggs and sperm, and increase the risk of ectopic pregnancy and miscarriage. Mothers who smoke while pregnant jeopardize fetal dental development and the birth weight of their infants. Certain birth defects, such as cleft palate and SIDS, are attributed to direct tobacco use, while babies raised in an environment of second hand smoke experience delayed tooth formation.

Adolescents who smoke are especially vulnerable to the addictive effects of nicotine. Although statistics from the National Institutes of Health (NIH) and Centers for Disease Control and Prevention (CDC) indicate that fewer teens from 1997 to 2003 chose to adopt a smoking habit, the downward trend of adolescent smoking has flattened and stabilized in recent years. Almost 3500 young people per day, between the ages of 12 to 17, admit they have tried a cigarette. Declines continued among 8th graders, with a noteworthy decrease in 2009; the proportion of young people saying they could obtain cigarettes fairly or very easily fell from 77% in 1996 to 56% in 2010, and in 2013 were shown to have declined significantly to 50%. Over the same time period, the decline among 10th graders was from 91% in 1996 to 71% in 2013. Approximately one quarter of adolescents become habitual smokers. With oral health compromised almost immediately, dental practitioners are in prime position to warn young patients about the long term effects of smoking and encourage them to cease this habit.

Quitting smoking is extremely difficult, especially for the 80% of Americans who began the habit before the age of 18. Yet the improvements to a person’s oral health is dramatic, and the overall risk for developing cardio-pulmonary diseases, and other smoking related disorders, is significantly reduced and improves with time. The American Dental Association (ADA) and the American Dental Hygienists’ Association (ADHA) advocate, along with other public health organizations, for the control of tobacco products, preventing their initiation among youth, and promoting cessation for all users. Many types of smoking cessation programs exist and every health care professional should be able to counsel patients on a basic plan of action to eliminate tobacco from their lives.

The intent of this course is to familiarize dental professionals with the impact of tobacco use on oral health through a discussion of the risk factors for certain oral diseases and conditions. Readers will also understand the dangers of smoking to the developing fetus, the impact of second hand smoke on non-smokers, and the available therapies to assist users, of any form of tobacco, to quit.
Tobacco Smoking

Just fewer than 18% of adult Americans smoke cigarettes. This number has dropped from 30% since the mid-2000s, which reflects the downward trend has leveled off since 1965. Approximately 8.8% of people over the age of 65 profess to smoke. This is a very small percentage compared to younger age groups and indicates how lethal the smoking habit is. According to the NIH and CDC, cigarette smoking is America’s leading cause of preventable death, accounting for approximately 480,000 deaths, or 1 of every 5 Americans, each year. It is also responsible for approximately $167 billion in medical costs and lost work productivity.

Tobacco smoke contains approximately 7,000 components in a cocktail of carbon monoxide, tar, formaldehyde, cyanide, and ammonia. No less than sixty-nine of these are carcinogenic, so no matter how a cigarette or cigar product is designed, smokers remain at significant risk for developing cancer, cardiovascular and respiratory diseases, reproductive disorders, and of course, oral lesions.

Ninety-nine percent of cigarettes sold in the U.S. are filter cigarettes. Twenty percent are mentholated brands. More than 50% of U.S. cigarettes have perforated filters made of cellulose acetate and plasticizers. Air entering the perforations dilutes the smoke and reduces the velocity of the air entering the burning cone. Twenty-five to 50% of U.S. cigarette blends comprise expanded tobacco, reconstituted tobacco, and open ribs and stems.

Changes in cigarette design have reduced tar emissions from 38 to 12 mg and nicotine emissions from 2.7 to 0.9 mg. Cigarette manufacturers marketed these products as light versions of their brands, leading smokers to believe that shifting to low-tar, low-nicotine cigarettes would be less harmful to their health. Low-nicotine concoctions tend to encourage smokers to inhale more intensely and more often to satisfy the brain’s receptors, and deliver the same toxic substances to the body. These varieties are still addictive and do not reduce the risk of smoking-related diseases.

As of June 22, 2010, cigarette companies are no longer permitted to use terms such as (ultra) light, low, or mild in advertising. This is due to provisions included in the 2009 Family Smoking Prevention and Tobacco Control Act.

The two main types of tobacco used in cigarettes are:

- Bright (flue-cured) tobacco
- Burley (air-cured) tobacco.

Blended cigarettes consist of 35% bright, 30% burley, and about 30% stems and ribs from both bright and burley tobaccos. Bright tobacco contains higher levels of carcinogenic Polyaromatic Hydrocarbons (PAHs) than burley tobacco contains.
Smokeless Tobacco

There are two main types of smokeless tobacco used in the United States:

- Chewing tobacco
- Snuff.

Chewing tobacco is commonly sold in loose-leaf form, but also exists in plug or twist variations. Snuff is finely ground tobacco that can be moist (most popular form), dry, or in tea-bag like pouches.

Smokeless tobacco users can sniff or inhale snuff through the nose, but most place the product in their cheek or between their gum and cheek. Users then suck on the tobacco and spit out the tobacco juices, which is why smokeless tobacco is often referred to as spit or spitting tobacco.

Smokeless tobacco is a significant health risk and is not a safe substitute for smoking cigarettes. Its use can lead to nicotine addiction and dependence. Chewing tobacco, which has been linked to dental caries, and snuff impact the oral health of people who use it, resulting in:

- Leukoplakia, a pre-cancerous oral lesion
- Oral and pharyngeal cancer
- Gum disease (gingivitis) and periodontal disease
- Staining of teeth and composite restorations.

The juice from smokeless tobacco contains 28 carcinogens, which can cause cancers in the esophagus, pharynx, larynx, stomach and pancreas. Users are six times more likely than non-users to develop oral and pharyngeal cancer, and these can develop within five years of initiating use. Youngsters who use smokeless tobacco are four times more likely to become cigarette smokers, and heavy users of smokeless or spit tobacco are almost 16 times more likely than non-users to be current consumers of alcohol.

Among high school males in the United States, smokeless tobacco use increased 36% from 2003 to 2009. The number of 12th graders admitting to smokeless tobacco use on the 2010 Monitoring the Future survey increased 39.3% since 2006. Users in the 10th grade also increased their numbers by 53% since 2004. Approximately 8% of all high school students are smokeless tobacco users, but the number reflects 15% of the population of high school males. An estimated 2.6 percent of middle school students are current smokeless tobacco users. In the U.S. adult population, an estimated 3% currently use smokeless tobacco. Use is much higher among men (6%) compared to women (0.4%).

Periodontal Disease

Risk Factors

Researchers examined physical exercise, alcohol consumption, tobacco use, hours of sleep, nutritional balance, mental stress, hours worked and eating breakfast. Tobacco use proved to be the prime indicating factor for progressive periodontitis. The study concluded that smoking might suppress the host-defense system, thereby promoting the advance of the disease.

Statistical studies have shown the severity of periodontal disease increases with the number of cigarettes smoked and the number of years an individual has smoked. Smokers have greater odds for more severe bone loss, periodontal attachment loss, as well as periodontal pocket formation compared to non-smokers. Tobacco use also masks gingival symptoms of inflammation, and creates an acidic environment in which periodontal-causing bacteria can exist and thrive. The result is high levels of periodontal pathogenic bacteria within the oral cavity. These bacteria can migrate through the bloodstream, ultimately affecting other body organs. Studies do suggest a link between advanced periodontitis and coronary heart disease, and that smoking is a co-factor in this relationship.

**Tobacco Users Incidence of Periodontal Disease**

Evidence from cross-sectional and case-control studies in various populations demonstrates that adult smokers are approximately three times as likely as non-smokers to have periodontitis. Although bacteria are the known cause for periodontal disease, smoking probably increases susceptibility to tissue destruction and periodontal pathogens through exaggerated inflammatory cell responses and immunosuppression. This effect on the host contributes to the growth of a more pathogenic bacterial flora within the bio-film.

Even when smokers keep plaque formation to a minimum with proper dental care techniques, they present deeper and greater numbers of periodontal pockets than do non-smokers. The alveolar bone loss results in a twofold prevalence of furcation (the region of a multirooted tooth at which the root divides) that can be documented by radiographs, and is a strong indication of a patients’ tobacco use.

Smokers often have advanced bone loss despite relatively healthy-appearing gingival tissues. This is especially evident in young patients between the ages of 19 and 30 years old. Smokers in this age group have almost four times the chance of developing periodontitis than individuals of the same age that have never smoked. Periodontal health status remains stable in former smokers and non-smokers, suggesting that abandoning the smoking habit is beneficial to the periodontium. Careful probing during an initial oral assessment can easily reveal such defects.

According to the American Academy of Periodontology (AAP), smokers present the following oral problems:

- Advanced calculus formation
- Deep pockets between teeth and gums
- Loss of the bone and tissue that support the teeth
- Oral cancer
- Dental cavities
- Partial and complete tooth loss
- Mouth sores
- Loss of taste.

Long-term, moderate to heavy use smokers do not often practice good dental hygiene; they need to be reminded of the importance of brushing and flossing two or more times per day. In addition to brushing and flossing, they need to be encouraged to perform thorough plaque control measures between clinic visits, along with suggesting mechanical plaque removal methods and the use of chemotherapeutic adjuncts.

Even with good oral hygiene, users of smoking and smokeless tobacco have poor response to periodontal therapies, thus cessation is critical to help prevent further tissue destruction. Although certain effects are reversible if patients stop smoking before beginning their dental treatment, periodontal complications may persist for years following smoking cessation. Teaching patients to perform regular self-examinations to screen for oral cancer and encourage frequent oral examinations and recall visits to maintain oral health should be emphasized.

**Recovery from Procedures**

Research shows that smokers take longer to heal after periodontal treatment than do former smokers or nonsmokers, and respond less favorably to non-surgical, surgical, and regenerative periodontal treatments.

Smoking impairs healing after non-surgical periodontal treatment, such as scaling and root planing that removes plaque and bacteria below the gum line. The results of one study suggests that after six to ten periodontal non-surgical treatments, 43% of smokers in the study required further treatment, while only 11% of nonsmokers required further treatment.

The success of gum grafting, a surgical procedure used to cover exposed root surfaces, and guided tissue regeneration, which is a procedure used to replace missing tissue supports around teeth, are both affected by smoking. These procedures tend to be more successful in nonsmokers, than smokers.

**Tooth Loss**

Tooth loss is the ultimate result of advanced periodontal disease. The Academy of General Dentistry (AGD) reports that moderate smokers can expect to lose four to five teeth by the time they are 35. Smokers are about twice as likely to lose their teeth as are non-smokers.

The indication comes from two separate 30-year studies from Tufts University. In the first study, male smokers lost up to three teeth after ten years of smoking one pack per day, while the non-smokers lost an average of one tooth in the same time period. After quitting, tooth loss was reduced to 1.7 teeth in 10 years.

In the second study, on postmenopausal women, those that smoked were twice as likely to lose one or more teeth per year after ten years as those who did not smoke. On average, smoking women lose one or two teeth every 10 years.
According to the CDC, about 20% of people over 65 who have never smoked are toothless, while 41.3% of daily smokers over age 65 have no teeth. Cigar smokers experience tooth loss and alveolar bone loss at rates equivalent to those of cigarette smokers, and pipe smokers experience tooth loss at similar rates.

To counter the ill effects of accelerated gum disease, all smokers can improve their oral hygiene by brushing and flossing conscientiously, and scheduling professional cleanings more often than recommended.

**Dental Caries**

Chewing tobacco has a high sugar content, which is one reason why it is linked to the risk of dental caries on tooth roots and crowns. A typical user holds a wad of chew in their mouth for approximately 30 minutes, several times a day, effectively exposing the teeth to tobacco and sugar for several hours each day. According to the NIH and the CDC, users of chewing tobacco are four times more likely to have one or more decayed root surfaces than those who never use this tobacco product. Chew and snuff also contribute to gingival recession raising tooth root sensitivity, and contributing to bone and tooth loss.

Users of chewing tobacco are also more likely to have root caries than users of snuff exclusively. One study states, out of 112 possible tooth surfaces, chewing-tobacco users had 3.84 decayed or filled root surfaces, more than any other tobacco-use group. The prevalence of caries also increased with the amount and length of time chewing tobacco was used.

**Oral Cancer**

Oral and throat cancers involve the tissues of the lips, tongue, oral cavity, pharynx, larynx and esophagus. They begin as leukoplakia or mouth ulcers, which are treatable in up to 90% of all cases. Lesions occur preliminarily on the floor of the mouth, cheek lining, gingiva, or palate. Once past the pre-cancerous stage, these tumors metastasize rapidly and easily invade the lymph nodes. Most oral cancers look very similar under the microscope and are called squamous cell carcinomas.

Tobacco use is implicated in more than eight out of ten of all deaths from malignant oral cancer. When evaluated in combination with alcohol use, it appears responsible for 80% of oral and pharyngeal cancer cases. The median age for oral and pharyngeal cancer diagnosis is 62 years; 95% of all cases occur over the age of 40. Men have twice the incidence as women, and Hispanics are diagnosed half as often as whites.

**Symptoms**

Dental practitioners can screen for oral cancer with a standard exam of the head and neck. Look for skin lesions, lumps, or ulcers that are:

- On the tongue, lip, or other mouth area
• Usually small
• Most often pale colored, may be dark or discolored
• May be a deep, hard edged crack in the tissue
• Usually painless initially
• May develop a burning sensation or pain when the tumor is advanced.

Additional symptoms associated with this disease include:

• Sores that do not heal
• Lumps on the lip or in the mouth or throat
• White or red patches on the gums, tongue, or lining of the mouth
• Unusual bleeding, pain, or numbness in the mouth
• Sore throats that do not go away, or a feeling that something is caught in the throat
• Difficulty or pain with chewing or swallowing.

**Tobaccos Role in Carcinoma**

Oropharyngeal carcinoma (OPC) is one of the 10 most common cancers worldwide, with a five year survival rate of only 59.1% for all stages combined, and the ten-year survival rate is 51%. If the cancer is diagnosed at an early stage, the five-year survival rate is 83%. The cancer forms in pharyngeal tissues (naso-, oro-, and hypo-) and can affect the larynx as well. Its development appears to be directly related to the frequency and duration of tobacco use. Heavy smokers, those who smoke 20 or more cigarettes per day or who choose unfiltered over filtered cigarettes, experience the greatest probability of contracting OPC, as well as other oral cancers. All smokers compound their risk through alcohol use. Oral cancer risk is 15 times higher for those who both smoke and drink compared to non-users of tobacco and alcohol products.

Smokers can eventually decrease their risk for developing any strain of oral cancer by quitting their smoking habit. The risk remains high during the first 10 years after cessation, but decreases dramatically after 10 years. Even after 10 years of cessation, ex-smokers still have about twice the risk as non-smokers of developing most oral cancers.

Smokeless tobacco use has been linked to hyperplastic, dysplastic, and malignant lesion development within the oral cavity. A large percentage of these leukoplakias occur at or near the smokeless tobacco placement site. Leukoplakia becomes cancerous in 20% to 40% of patients.

In a study, more than 75% of regular smokeless tobacco users had mucosal lesions where the tobacco was habitually held, and the risk increases the longer the tobacco is held at a certain place. Most of these lesions were diagnosed as hyperkeratoses, with only a small number of carcinomas or epithelial dysplasias.

Smokeless tobacco keratosis is described as a wrinkled or folded lesion, with or without change in color. The lesions range from least severe, with no change in color, to most severe, with a yellowish or brown color and deep-reddened furrows. Snuff users experience more severe lesions than chewing tobacco users, and some studies have determined that smokeless tobacco
keratosis is distinct from smoking-induced leukoplakia and has a very low probability of malignant transformation.

When smokeless tobacco use is discontinued, lesions heal much more rapidly in chewing tobacco users than in snuff users. Smokeless tobacco users also risk gingival recession, with snuff users having a higher risk of gingival recession.

The National Cancer Institute’s Surveillance Epidemiology and End Results (SEER) study (2001 to 2007) determined an overall 5 year survival rate of 60.8% for oral cancer patients relative to the general population. The addition of HPV as a risk factor for oral cancer has made it difficult, if not impossible, to easily define high risk individuals. Opportunistic mass screening is the only viable choice to find oral cancer at precancerous or very early stage high survival stages.

Early detection is key to the success of treatment and rehabilitation, and cessation from smoking and drinking improves a patient’s prognosis. Unfortunately, more than 50% of oral cancers are advanced at the time the cancer is detected. Most have spread to the throat or neck. Approximately 25% of people with oral cancer die because of delayed diagnosis and treatment.

**Tobacco Affects Dental Development**

Women who smoke while pregnant, put their unborn children at risk for all sorts of developmental defects, including those related to teeth and bones. The CDC reports that maternal cigarette smoking in the first trimester has been associated with a 20% to 70% greater likelihood that a baby would be born with certain types of congenital heart defects. The Surgeon General of the United States has pointed out the toxins from tobacco smoke inhalation contributes to premature and stillbirth, low birth weight babies, and death from SIDS (Sudden Infant Death Syndrome).

According to the 2008 Pregnancy Risk Assessment and Monitoring System (PRAMS) data from 29 states, approximately 23% of women reported smoking 3 months prior to pregnancy and 12.8% of women reported smoking during the last three months of pregnancy. This statistic has declined since 1987, when PRAMS first began collecting data to investigate emerging issues in the field of maternal and child health, yet many children are still at significant risk for developing the following oral defects due to fetal exposure to maternal tobacco use: cleft palate, dental asymmetry, crown size reduction, low birth weight and delayed tooth growth.

**Cleft Palate**

Cleft palate, a congenital condition that is often associated with tobacco use during pregnancy, is one of the most common birth defects. Oral clefts occur in about one in 2000 live births and are more prevalent in Caucasians, occurring in one in 1,000 live births. The severity can range from a split uvula to a cleft the length of the roof of the mouth. The most severe forms require surgery and cause multiple problems in speaking, eating, and breathing. The likelihood of a cleft palate increases 25% when the mother smokes during pregnancy, due to the fact that cigarette smoke decreases the oxygen available to the embryo during early development.
**Dental Asymmetry**

Maternal tobacco use has also been shown to cause dental asymmetry in offspring, and one study linked smoking and obesity to dental asymmetry. A combination of obesity and smoking 20 or more cigarettes a day was shown to be a significant predictor of fluctuating asymmetry. Levels of asymmetry tended to be higher in molar and incisor teeth, with the buccolingual diameter showing more fluctuation than the mesiodistal diameter.

**Crown Size Reduction**

Studies have noted trends of tooth crown size reduction in permanent first molars, deciduous second molars, and permanent incisors in relation to the sex of the offspring, race, and smoking habits. The greatest reduction in crown size was shown in daughters of Caucasian mothers who smoked more.

Maternal smoking during pregnancy may have an effect on the basic growth processes that affects tooth development at some critical period during the postnatal formation of tooth crowns. Studies have disagreed on whether gender of the offspring plays a role. However, maximum differences were found in children subjected to cigarette smoking from both parents.
Low Birth Weight

Maternal tobacco use is responsible for 17% to 26% of low birth weight babies. Seven percent of preterm deliveries could be prevented if mothers abstained from smoking during pregnancy. Periodontal disease increases the risk of preterm low birth weight babies by almost six-fold. Eighteen percent of premature births may be attributed to Porphyromonas gingivalis infection. Periodontal disease and tobacco use seem to occur along common biochemical and cellular pathways. If periodontal disease is prevented, more than 45,000 preterm low birth weight births may be eliminated yearly, saving intensive care units almost $1 billion every year.

Delayed Tooth Growth

Children who are exposed to tobacco smoke may have delays in their permanent tooth formation. Exposing children to smoke can delay the development of a child’s permanent teeth by an average of four months. The most significant delays have been observed when both parents smoke, while the least delays have been caused when only the mother smokes. This indicates how strong the effects from second hand smoke are and how important it may be for BOTH parents to not smoke during a pregnancy.

Tobacco Affects Menopause and Osteoporosis

Because tobacco use hastens bone loss, and because hormonal changes during menopause increases a woman’s risk of osteoporosis, women who smoke can expect to experience the most severe and uncomfortable oral changes during this stage of life. Oral changes occurring during menopause, include:

- Osteoporotic bone loss of the mandible
- Taste alteration
- Dry mouth
- Burning mouth syndrome
- Sore and sensitive gums.

Women who smoke may experience an earlier onset of these oral conditions, since tobacco use may induce premature menopause. Other oral health problems; such as tooth loss and periodontal disease, are early signs of osteoporosis. Because tobacco use is a key risk factor for both of these health issues, dental practitioners can screen and potentially intervene in their progression.

A woman who smokes a pack of cigarettes a day throughout her adult life will have an average deficit in bone density of 5% to 8% by the time she reaches menopause. Postmenopausal women who have never smoked can retain almost twice as much bone density when compared to a smoker. Tobacco use exacerbates osteoporotic-induced oral conditions. Since nicotine interferes with the absorption of calcium from the small intestine, this could potentially decrease total bone mass, which in turn could affect overall periodontal health.
Reducing Tobacco Use

Both the American Dental Association (ADA) and the American Dental Hygienists Association (ADHA) have resolved to advocate for tobacco use prevention and cessation. The ADA encourages dental professionals to discourage patients from smoking and to establish a smoke-free workplace. Because tobacco use exacerbates periodontal disease, tooth decay and loss, precancerous lesions and other oral health conditions previously discussed, every dental professional should be able to deliver a clear message about tobacco cessation.

According to several studies, most patients would accept help to cease smoking from their oral health professional, but many practitioners do not offer support for tobacco cessation for a variety of reasons: too much time is required, it is too expensive, they are resistant, unprepared, or both. Many on the oral care team lack knowledge about adequate referral sources, yet there is plenty of professional support.

Resources from the Public Health Service and U.S. Surgeon General’s Office supply guidelines for developing in-office objectives that deliver and support the tobacco cessation message. Clinicians can learn about evidence-based strategies and recommendations for counseling that can help patients and fellow employees quit the tobacco habit.

The ADA distributes a Tobacco Cessation Card on smoking cessation from its web site that offers tobacco cessation tips and options for pharmacotherapy. To find this card, go to the ADA website and search on Tobacco Cessation Card. Universities and other educational networks provide programs that teach health care providers how to incorporate a nicotine dependence treatment into their practice.

The Public Health Service’s Agency for Healthcare Research and Quality (AHRQ) regularly updates a comprehensive manual on Treating Tobacco Use and Dependence. The Quick Reference Guide for Clinicians, located at www.ahrq.gov/clinic/tobacco/tobaqrg.htm, directs oral care providers to implement five A’s that can encourage smoking patients to reconsider their nicotine use and accept an intervention program that will treat their addiction:

- **ASK** - Routinely inquire about tobacco use at every visit to determine what type of tobacco products are used.
- **ADVISE** - Remind patients of the severe health implications of tobacco use and discuss quitting strategies.
- **ASSESS** - Determine patients’ readiness to quit; offer tobacco cessation material to those who are motivated. Give gentle encouragement to smokers who lack initiative.
- **ASSIST** - Suggest a quit plan and give advice on possible alternatives. Remind patients that successful quitting usually comes after multiple attempts.
- **ARRANGE** - Follow-up on future visits and monitor patients who have decided to quit.
The U.S. Department of Health and Human Services maintains a national toll-free hotline, 800-QUIT-NOW, for any smoker seeking information and assistance in quitting. The call provides an access point for many forms of support, including free quit coaching, a free quit plan, free educational materials, and referrals to local resources.

Besides arresting the progression of smoking-related disease and disorders in users of tobacco products, reducing the prevalence of tobacco smoke also improves the health of non-smokers. Secondhand exposure to tobacco smoke heightens the risk of coronary heart disease by 25% to 30% and lung cancer by 20% to 30% among those regularly exposed to secondhand smoke, also known as Environmental Tobacco Smoke (ETS).

The U.S. Environmental Protection Agency (EPA), the National Toxicology Program, the International Agency for Research on Cancer (IARC), and the National Institute for Occupational Safety and Health (NIOSH), all recognize that ETS is a known carcinogen, containing over 50 cancer causing agents that appear in higher concentrations than in smoke directly inhaled. The Surgeon General has concluded there is no risk free level of exposure to ETS. Separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposure of nonsmokers to secondhand smoke. A smoke-free environment is the only way to fully protect nonsmokers from the dangers of secondhand smoke.

**Smoking Cessation Therapy**

The addictive substance in tobacco is the chemical compound nicotine. It is a stimulant that causes neural changes by first exciting the *reward pathway* or pleasure centers of the brain that are mediated by the neurotransmitter *dopamine*. Once nicotine hits the bloodstream after inhalation through the lungs, or the tissues in the cheek in the case of smokeless tobacco, epinephrine discharges from the adrenal cortex, followed by a quick release of glucose. As nicotine metabolizes, it sedates the nervous system. This causes a mild fatigue, compelling users to light up another one, or break off a new wad.

Over time, nicotine receptors become desensitized to the presence of nicotine, so many smokers choose to increase tobacco use to produce the same sense of pleasure. This phenomenon of increased use is known as *tolerance* and contributes to nicotine dependency. Even after long-term abstinence from nicotine use, these brain receptors remain altered, which explains why the habit is so difficult to stop and why nicotine dependency can be considered a brain disorder.

For the greatest chance at success, tobacco users should utilize a multifaceted approach to cessation and be prepared to make multiple attempts following inevitable relapses. Intervention programs that involve counseling and prescription medications are appropriate and readily available for tobacco users who attempt to end their habit. When used in combination with good behavioral treatments, these methods work to free motivated quitters from their addiction.

Behavioral modification therapies employ a variety of methods to assist smokers in quitting. Brief clinical intervention, when a health professional assesses a patient’s inclination to quit and introduces the next steps to take, can start an individual on the path to better health. Other forms
range from self-help materials to intensive individual counseling. All methods teach individuals to recognize their patterns of substance use and develop coping strategies to deal with them.

Nicotine replacement therapies (NRTs) and other prescription drugs decrease cravings and withdrawal symptoms associated with tobacco dependency and help increase the likelihood of success. NRTs deliver a controlled dose of nicotine to a smoker in order to relieve irritability, anxiety, difficulty concentrating, depressed mood, decreased heart rate, and increased appetite. Current over-the-counter NRT products include: nicotine chewing gum, the nicotine transdermal patch, nasal sprays, inhalers, and lozenges.

Nicotine can be prescribed for therapeutic purposes, although high doses cause tachycardia, and an overdose can lead to arrhythmia. Patients using nicotine replacement therapy should regularly have blood pressure and vital signs monitored. Use caution when administering a local anesthetic with a vasoconstrictor to patients using these products. It’s important for all dental professionals to be familiar with all drugs used for tobacco cessation, their respective mechanisms of action, dosing schedules, and contraindications. This will help the dental professional to identify patients who are good candidates for these medications, and help guide the patient to properly comply with a drug therapy.

The use of NRTs may lead to the following symptoms:

- Excessive salivation
- Soreness of the mouth and/or throat
- Dizziness
- Nervousness
- Gastrointestinal side effects.

Side effects may be related to:

- The dose of nicotine
- The brand of patch
- Skin characteristics and allergies (some people have reactions to patch adhesives)
- How long the patch is used
- How it is applied.

Nicotine gum should not be used in patients with a history of Temporo Mandibular Joint disorder (TMJ), as it may exacerbate TMJ disorder discomfort. General side effects associated with gum, lozenges, and transdermal patches include:

- Xerostomia
- Taste alteration
- Ulcerative stomatitis and glossitis
- Increased gingival bleeding in some patients.

Other prescription medications used for smoking cessation include:
• Bupropion (Zyban)
• Varenicline (Chantix).

Bupropion is an antidepressant medication that inhibits the reuptake of dopamine and norepinephrine, thus reducing nicotine cravings. Since there are many drug interactions with this medication, a drug reference guide must be consulted to ensure compatibility with other current patient medications. Dental professionals should carefully monitor blood pressure and vital signs when treating patients taking this medication. Caution should be used when administering local anesthetic with a vasoconstrictor to patients using this medication.

Oral side effects of Bupropion include:

• Xerostomia
• Taste alteration.

General side effects of Bupropion include:

• Seizures
• Elevated blood pressure.

Varenicline is a medication which directly stimulates dopamine, but to a lesser extent than nicotine. This drug also decreases cravings and withdrawal symptoms. The FDA has issued a warning about the possibility of serious neuropsychiatric symptoms occurring with the use of varenicline. Dental professionals should question whether a patient taking this drug is experiencing atypical behavior or mood changes. If the patient has suicidal thoughts or actions, the patient should stop taking varenicline and contact their primary care physician. This warning appears on the drug’s label.

Oral side effects of Varenicline include:

• Xerostomia
• Taste alteration.

General side effects of Varenicline include:

• Insomnia
• Headache
• Abnormal dreams
• Nausea.

Electronic Cigarettes

Some British studies suggest that e-cigarettes may be a useful tool in smoking cessation. The studies showed that people using the e-cigarettes were about 60% more likely to succeed than who used the nicotine patches and/or gum or tried to use willpower alone to quit smoking.
Toxicity reports show that e-cigarettes are less likely to increase risk for cancer than cigarettes, however some e-cigarettes do have harmful byproducts in them which may increase cancer risk.

Although quitting smoking without e-cigarettes or other nicotine containing tools is ideal, it is still thought that quitting in one way or another is better than not quitting at all.

**Smoking Cessation Resources**

For practical and beneficial resources for cessation support, visit the following public sites:

- American Lung Association - Stop Smoking, [www.lungusa.org/stop-smoking](http://www.lungusa.org/stop-smoking)
- Smoking Cessation, [www.smoking-cessation.org/index.asp](http://www.smoking-cessation.org/index.asp)
- Centers for Disease Control and Prevention (CDC), 800.QUITNOW, (800.784.8669), [www.cdc.gov/tobacco/quit_smoking/index.htm](http://www.cdc.gov/tobacco/quit_smoking/index.htm)
- Tobacco Free Kids, [http://tobaccofreekids.org](http://tobaccofreekids.org)
Conclusion

Tobacco use threatens individual and public health all over the world. The World Health Organization (WHO) reports it is the leading cause of death, illness and impoverishment, depriving families of income, slowing the course of economic development, and raising the cost of health care. Low and middle income countries face the heaviest consequences of tobacco use, where more than 80% of the world’s one billion smokers assume increased risk factors for oral and other cancers, lung, and cardiovascular diseases. Secondhand smoke is also a significant health concern, it causes 600,000 premature deaths yearly, a risk factor for cardio-respiratory disease and cancer in non-smoking adults, and SIDS in infants.

Oral care professionals can help reduce the impact of tobacco used by their patients by providing conscientious health care interventions. A thorough assessment of the soft tissue of the mouth during routine dental exams can reveal cosmetic staining and many early signs of deterioration including: advanced gingivitis, periodontitis, tooth decay, missing teeth, leukoplakia, and pre-cancerous lesions. Clinicians can be prepared to question patients about their tobacco use patterns and inform them of the consequences of their destructive habit. Contact the ADA for brochures available through the ADA catalog, at www.adacatalog.org, that can help educate patients on the topics of smokeless tobacco, smoking cessation and oral cancer.

While treatment for tobacco use and dependence is not routine in all areas of dentistry, any dental clinic can implement a smoke-free workplace and encourage smoking cessation among employees. Many online resources from state and federal initiatives offer comprehensive guidelines that can help establish a smoke-free workplace policy. Visit the CDC’s Healthier Worksite Initiative, at www.cdc.gov/nccdphp/dnpao/hwi/toolkits/tobacco/index.htm, to view one toolkit example. Everyone deserves a brighter smile and better health.
References

American Heart Association (AHA) – Nicotine Addiction, www.heart.org/HEARTORG/GettingHealthy/QuitSmoking/QuittingSmoking/Why-is-it-so-hard-to-quit_UCM_324053_Article.jsp

American Dental Association (ADA) – Smoking and Tobacco Cessation, www.ada.org/5170.aspx?currentTab=1

American Dental Association (ADA) – Canker Sores, Cold Sores & Common Mouth Sores, www.ada.org/2982.aspx?currentTab=1


Academy of General Dentistry (AGD) - Up In Smoke, The Dentist’s Role in Tobacco Cessation, www.agd.org/publications/articles/?ArtID=3667


Centers for Disease Control and Prevention (CDC) – Smoking and Tobacco Use, cdc.gov/tobacco


Dynamic Dental Educators – Tobaccos Oral Health Effects