



The changing tobacco landscape

What dental professionals need to know

Elizabeth T. Couch, MS, RDH; Benjamin W. Chaffee, DDS, MPH, PhD; Stuart A. Gansky, MS, DrPH; Margaret M. Walsh, MA, MS, EdD, RDH

Since the 1964 surgeon general's report on smoking and health,¹ smoking prevalence in adults has dropped from 42.4% in 1965 to 17.9% in 2013.² This decline demonstrated great progress in tobacco control. Yet, tobacco use remains the single leading cause of preventable death in the United States.^{3,4} Each year, an estimated 480,000 people die prematurely from tobacco-related illnesses,¹ resulting in related direct medical costs reaching nearly \$170 billion annually.⁵

Despite overwhelming evidence linking tobacco use to systemic and oral disease, 21.3% of all US adults and 24.6% of all US high school adolescents report using at least 1 tobacco product.^{6,7} More than 3,800 adolescents and young adults initiate tobacco use each day, and 80% of people who begin using regularly before 18 years of age will continue tobacco use into adulthood.¹ Adolescents and young adults are also more likely than older adults to initiate use of multiple tobacco products. In 2014, a study of adolescents and young adults found that among active tobacco users, 25% reported using at least 2 tobacco products, and 21% reported using more than 2 tobacco products.⁸ With these trends, 5.6 million US adolescents younger than 18 years today will subsequently die prematurely from tobacco-related disease.³

The tobacco industry has expanded its product range. Besides cigarettes, products including conventional smokeless tobacco (ST) (oral snuff and chewing tobacco), snus (moist, pulverized compressed ST in a tea-bag-like sack), compressed dissolvable tobacco, cigars, water pipes (hookahs), and electronic cigarettes (e-cigarettes) account for a substantial portion of product use.

The two largest cigarette companies, Reynolds America (maker of Camel) and Altria (maker of Marlboro) have expanded their offerings to include traditional and new ST products and e-cigarettes.⁹⁻¹¹ Aggressive marketing includes claims that these products are "safe" or "harmless" alternatives to cigarettes. Such promotional tactics can be misleading, as these products are associated

ABSTRACT

Background. Tobacco products in the United States and the patterns of tobacco use are changing. Although cigarette smoking prevalence has declined, dental professionals are likely to encounter substantial numbers of patients who have tried and are continuing to use new and alternative tobacco products, including cigars, water pipes (hookahs), and electronic cigarettes, as well as conventional and new smokeless tobacco products.

Methods. The authors reviewed conventional and new tobacco products in the United States, their adverse oral and systemic health effects, and their prevalence of use.

Results. Tobacco products other than cigarettes account for a substantial portion of tobacco use. For this reason, tobacco-use prevention and cessation counseling provided by dental health care professionals must address all tobacco products, including cigarettes, cigars, water pipes, and electronic cigarettes, as well as conventional and new smokeless tobacco products. Cigarette smoking and smokeless tobacco use are associated with immediate and long-term adverse health effects, including nicotine addiction, oral and systemic disease, and death. Novel products may attract new tobacco users, potentially leading to addiction that results in enduring tobacco product use and associated adverse health effects.

Conclusions. This critical review of conventional, new, and emerging tobacco products presents information that dental professionals can use in providing tobacco-related counseling to patients who use or who are at risk for using tobacco products.

Practical Implications. It is essential that dental professionals are knowledgeable about tobacco products and are able to answer patients' questions and provide them with evidence-based tobacco-related counseling. This information may prevent patients from initiating use or help reduce or cease use to avoid immediate and long-term adverse health effects, including nicotine addiction, oral and systemic disease, and death.

Key Words. Tobacco use trends; tobacco products; electronic cigarettes; smokeless tobacco; alternative tobacco products; continuing dental education; dental professionals.

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with tobacco-use initiation and progression to regular use, with resulting nicotine addiction, especially among vulnerable populations, such as youth.¹²

Dental professionals are well positioned to help patients stop using tobacco and to prevent nonusing patients from initiating use. To facilitate effective patient education and advice, we review and summarize the most common types of tobacco products on the market, their actual and potential adverse health effects, and prevalence of use among various US populations.

CIGARETTES

Description. Cigarettes consist of finely chopped tobacco leaves rolled in a paper wrapper (Figure A). During inhalation, smokers absorb nicotine and carcinogens, such as *N*-nitrosamines, aromatic hydrocarbons, and polonium 210.^{3,13} Nicotine absorbed in the bloodstream enhances addiction potential, leading to tobacco and nicotine dependence. In addition, smokers are exposed to tar, carbon monoxide, and more than 7,000 chemical toxins in tobacco smoke when it enters the bloodstream and distributes throughout the body.³

Adverse health effects. Cigarette smoking has numerous short-term and long-term adverse health consequences for nearly every human organ system (Box 1^{4,14}). Cigarettes also affect people exposed to environmental tobacco smoke exhaled during cigarette smoking or accumulated residue on nearby surfaces, that has been linked to cancer, periodontal disease, respiratory and cardiovascular diseases, and adverse health effects among children and infants.^{4,15}

Prevalence of use. Adult cigarette use (reported as every day or some days) in the United States has dropped considerably in the past decade, from 20.9% in 2005 to 17.9% in 2013²; yet smoking continues to be higher among males (20.5%) and in groups traditionally associated with economic or social disadvantage, such as those with household incomes below the poverty threshold (29.2%), those with a General Education Development credential (41.4%), and racial and ethnic minorities that include American Indian and Alaskan Natives (26.1%).² In addition, lesbian, gay, bisexual, or transgender (LGBT) adults report much higher use (26.6%) than heterosexual adults (17.6%).²

Although declining, any cigarette use among US adolescents is alarming. According to the data collected from the National Youth Tobacco Survey (NYTS), 9.2% of high school students and 2.5% of middle school students reported use of cigarettes.⁷ However, 2013 data from the Youth Risk Behavior Surveillance survey reported a higher prevalence of use among high school students (15.7%).¹⁶ According to data from the NYTS, among high school students, male students (10.6%) and non-Hispanic white students (10.8%) reported a higher prevalence of smoking than did female students (7.9%) and non-Hispanic black students (4.5%).⁷

CONVENTIONAL AND NEW SMOKELESS TOBACCO PRODUCTS

Description. Conventional ST products are oral snuff and chewing tobacco. Oral snuff is finely ground tobacco, packaged either loose or in tea bag–like sachets (Figure B). Typically, snuff users place a small amount (pinch) of oral snuff, also called a dip, between the buccal mucosa and gingiva for approximately 30 minutes.¹⁷

Chewing tobacco is coarsely shredded tobacco, sometimes sold in bricks and twists (Figure C). Chewing tobacco users place a loose-leaf tobacco chaw, or compressed tobacco plug, against the buccal mucosa and chew it. Both dip and chewing tobacco users usually expectorate the tobacco-saliva juice, but more addicted users sometimes intentionally swallow it.¹⁸ Both oral snuff and chewing tobacco contain cancer-causing chemicals, including *N*-nitrosamines, aromatic hydrocarbons, formaldehyde, and polonium 210.¹⁹

Snus is a newer ST product in the United States, modeled after Swedish snus, a relatively low-carcinogen, high-nicotine-content oral tobacco snuff (Figure D).^{20–23} Snus is moist, finely ground tobacco, typically contained in small tea-bag–like sachets and used like oral snuff. Although Swedish and US snus share a name and appearance, they are manufactured differently. Swedish snus is heat treated for 2 to 3 days, generating a relatively sterile product. However, US snus is fermented, yielding higher carcinogen content.²⁴ Although Swedish snus is usually known for having higher levels of total nicotine, the level of bioavailable nicotine varies greatly across brands of US and Swedish snus.²⁵

Dissolvable compressed tobacco is a new ST product made from finely milled tobacco and available as orbs, sticks, and strips. These products closely resemble mints, toothpicks, or breath strips, and dissolve orally.²⁶ Both snus and dissolvable tobacco products are marketed as spitless (“dry”) products available in flavors, such as menthol, spice, alcohol, fruit, and candy. Their use is easily concealed, increasing their appeal to adolescents and young adults.^{21,22} Dissolvable tobacco products are available in a select number of locations in the United States, whereas the sale of snus is generally widespread.

Adverse health effects. ST use is associated with increased risks of oral²⁷ and pancreatic cancer,²⁸ oral mucosal lesions (for example, oral leukoplakia),^{29–31} nicotine dependence,³² and possibly cardiovascular disease.^{33,34} ST use also causes oral conditions such as gingival keratosis, tooth discoloration, halitosis, enamel erosion, gingival recession, alveolar bone damage, periodontal disease, dental caries due to sugars in the

ABBREVIATION KEY. e-cigarettes: Electronic cigarettes. FDA: Food and Drug Administration. LGBT: Lesbian, gay, bisexual, or transgender. NYTS: National Youth Tobacco Survey. ST: Smokeless tobacco. TSNA: Tobacco-specific nitrosamines.

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