

Tobacco and Oral Health

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This Research Report examines the effects on oral health of the use of tobacco products. It contains graphic images.

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Introduction

Tobacco use is the leading cause of preventable illness and premature death¹ and the principle risk factor for oral cancer.² Approximately half of all smokers will die of a smoking-related illness.³ According to the US Surgeon General, “there is no risk-free level of exposure to tobacco smoke, and there is no safe tobacco product.”⁴ Tobacco use is also a risk factor for, or cause of, numerous other illnesses and conditions such as oral mucosal diseases, halitosis and periodontitis.

The health effects of tobacco use on oral health

The smoking and chewing of tobacco products has a number of well documented detrimental effects on the oral cavity.² These range from those that alter a person’s appearance to others that are potentially fatal. The following are the principle conditions/diseases for which tobacco use carries an increased risk

Aesthetic

The smoking and chewing of tobacco products can have a dramatically negative impact on a person’s appearance.



- Smoking and chewing tobacco stains and discolours teeth, dentures and restorations.^{2,5,6}
- Pipe smokers and smokeless tobacco users are prone to excessive wear on their teeth, which often become flat. The eventual exposure of tooth dentine can lead to deep tobacco staining.^{7,8}
- Tobacco, whether smoked or chewed, can cause halitosis.²
- Cleft lips and palates are twice as common amongst children born to mothers who smoked during pregnancy.^{9,10,11}
- Tobacco-associated bad breath is related to the strength of tobacco smoked. Pipes and cigar tobacco contain a higher concentration of sulphur that produces stronger bad breath. The use of breath freshening mints to alleviate the bad breath can themselves cause dental erosion due to the large quantities of sugar and citric acid contained in them.¹²
- Smokers have higher levels of calculus formation than non-smokers. Calculus, also known as tartar, is a form of hardened dental plaque. The rough surface of calculus enables more plaque to stick to teeth and cause gum disease and cavities to form.⁴

Dental implants

Tobacco can be damaging to both the initial and long-term success of dental implants.^{5,13} Smoking is the most significant risk factor in the failure of dental implants.^{14,15}

Heart disease

The 2010 Scottish Health Survey found that poor oral hygiene was associated with higher levels of risk for cardiovascular disease.¹⁶ Researchers concluded that periodontal disease, a chronic infection of the tissues surrounding the teeth (see page 6) can lead to raised levels of C reactive protein which is an indication of systemic inflammation. It is believed that systemic inflammation could represent the underlying link between cardiovascular disease and poor oral health. Smoking is strongly associated with periodontitis.¹ (See Periodontal Disease below)

Oral cancer

All forms of tobacco use are known to cause oral cancer and the US Surgeon General concludes that tobacco use is a major cause of oral cancer.¹ Based on the International Classification of Diseases (ICD) oral cancer includes all cancers of the lip, tongue, gingiva, all of the oral mucosa and oropharynx but not cancers of the major salivary glands, hypopharynx and nasopharynx.



Cancer Research UK cites the following risk factors for oral cancer:

- Smoking tobacco – cigarettes, pipes and cigars
- Smokeless tobacco (chewing tobacco) – e.g. snuff, gutkha,
- Betel quid – with or without tobacco
- Excessive alcohol consumption
- Prior history of oral / aerodigestive cancers
- Age – Increasing age is a risk but oral cancer can occur at any age
- Poor diet - deficiencies, especially of certain minerals and vitamins including A, C and E; Beta carotene is protective
- Sun exposure (especially for lip cancer)
- Human papillomavirus and immunosuppression
- Potentially malignant oral disorders¹⁷

It has been estimated that tobacco use accounts for more than 90% of oral cancers.¹¹ A 2008 meta-analysis found that smokers have a three-fold increased risk of oral cancer.¹⁸ The smoking associated risk of oral cancer risk is both dose and duration dependent.^{19,20} Most available data refer to cigarette smoking but cigar and pipe smoking is also associated with increased risk of oral, lip, oesophageal and pharyngeal cancers.²¹

Smokeless tobacco users are also at an increased risk.²² Most cancers occur within the oral cavity itself: the most common place for them to exist are the tongue (20%), the gingiva (gums) (18%), floor of mouth (12%), lip (11%) and salivary gland (8%).²³

There is some evidence to suggest that exposure to secondhand smoke (SHS) may increase oral cancer, with a 63% increase in risk shown among never smokers exposed to SHS at home or at work. Among those exposed at home and at work for more than 15 years, there was an 84% increased risk.²⁴

Oral leukoplakia is the most common form of potentially malignant disorder in the oral cavity. There is some evidence which suggests that smoking is significantly related to the development of oral leukoplakia and that the risk increases with the number of cigarettes smoked.²⁵ It is estimated that three out of every four users of smokeless tobacco will develop an oral leukoplakia at the site where they hold the tobacco product in their mouth.²⁶

Smokers who consume alcohol are at an even higher risk of oral cancer due to the synergistic effects.^{27,28} Various studies have shown that a causative relationship exists between oral cancer and the heavy intake of alcohol and that the combination of tobacco and alcohol use raises the risk for oral cancer significantly more than the use of either substance alone. Heavy drinkers who also smoke have 38 times the risk of oral cancer compared to non smokers who do not drink.²⁹ Alcohol increases the permeability of the oral mucous membranes which is thought to enhance the carcinogenic effect of tobacco based products.³⁰

Smoking cessation reduces the risk of oral cancer.¹ However, there is some evidence to suggest that it may take at least twenty years for the risk to fall to that of never smokers.³¹

Oral cancer statistics

In the UK in 2008 there were 5,410 incidences (newly reported cases) of oral cancer and 1,822 deaths, accounting for 2% of cancer diagnoses in the UK (see Table 1).^{32,33,34} World-wide there are approximately 405,000 new cases of oral cancer every year, with two thirds of those occurring in developing countries.³⁵

Table 1: Comparison of Cancer Statistics in the UK (2008)³⁶

	Incidences of Cancer			Deaths from Cancer		
	Male	Female	All	Male	Female	All
Bladder	7,390	2,945	10,355	3,272	1,729	5,002
Breast	34147,693		48,034	69	12,047	12,116
Cervical		2,938	2,938		957	957
Colo-Rectal	22,097	17,894	39,991	8,758	7,501	16,259
Kidney	5,377	3,380	8,757	2,306	1,542	3,848
Lung	22,846	17,960	40,806	19,868	15,393	35,261
Oral	3,824	1,966	5,790	1,153	669	1,822
Ovarian		6,537	6,537		4,373	4,373
Prostate	37,051		37,051	10,168		10,168
All cancers	210,340	198,041	408,381	81,712	75,011	156,723

- Oral cancer is more common in men than women and men have higher death rates than women.
- 87% of oral cancer cases in the UK are in people aged 50 or over.
- More than 90% of oral cancer cases are squamous cell carcinomas.
- Around 30% of oral cancer cases occur in the mouth and 30% on the tongue.
- Lip cancer accounts for 6% of oral cancers.
- Internationally, the highest death rates from oral cancer occur in countries in the western Pacific region and Sri Lanka where chewing tobacco is common.

There is a strong correlation between the incidence of oral cancer and poverty in the UK. Statistics show that the highest number of oral cancer cases occur within the most deprived areas of Britain.³⁷

Oral mucosal diseases

Tobacco use is associated with a range of changes to the oral mucous membrane cells. The diseases most commonly associated with smoking are:

- Smoker's palate (nicotinic stomatitis): A change in the hard palate caused by heavy smoking. The palate turns white and can be littered with red dots located within small raised lumps. This condition is not pre-malignant and disappears after smoking is stopped. A national cohort study in the US concluded that smokeless tobacco users had the highest incidence of nicotinic stomatitis.³⁸
- Smoker's melanosis: Smokers are more likely to develop local areas of melanin pigmentation

of their mucous membranes.³⁹ The condition is not pre-malignant and is reversible after quitting smoking.⁴⁰

- Oral Candidosis: An opportunistic mucosal infection caused by the *Candida albicans* fungus. Smoking is a risk factor for this infection but the mechanism is not fully understood. However, it has been suggested that tobacco use depresses the immune system, making smokers more susceptible to infection.⁴¹

Periodontal diseases

Periodontal diseases are inflammatory disorders of the periodontium (the tissue which surround and support the teeth) and include gingivitis, which affects the gums, and periodontitis, which may involve all structures and bone supporting the teeth. There is a clear association between tobacco use and periodontal disease.^{11,42}

- Tobacco smoking is a risk factor associated with chronic destructive periodontal disease.^{11,43}
- There is evidence that smokeless tobacco is a cause of periodontal disease.^{44,45}
- It has been estimated that a smoker has between a 5 fold and 20 fold increased risk of periodontal disease.⁴³
- The risk of alveolar bone loss is seven times greater amongst smokers than non smokers.⁴⁶
- The association between gingivitis and smoking was established in 1946.¹¹ The severity of periodontal disease increases with the number of cigarettes smoked.⁴⁷
- There is some evidence to suggest the effect of tobacco use on periodontal tissues is more pronounced in male smokers than female.⁴⁸
- Smokers exhibit higher rates of tooth loss than non-smokers.⁴³
- The outcome of periodontal treatment is less favourable or unfavourable in smokers.⁴³
- Smokers have decreased levels of salivary and serum immunoglobulins which impairs their ability to fight the bacteria in the oral cavity. Smoking also alters the cells that attack bacteria which affects a smoker's ability to clear pathogens.¹¹

There is good evidence to suggest that quitting smoking reduces the risk of periodontal disease.⁴⁹ However, it can be many years before a former smoker's risk of tooth loss falls to that of a never smoker.⁴⁹

Dental caries

Dental caries is the medical name for tooth decay but also refers to the manifestation of a bacterial infection which causes the decay.¹¹ The US Surgeon General's 2000 Report "Oral Health in America" concluded that tobacco use was a risk factor for dental caries and recommended that dental healthcare professionals include smoking cessation counselling as part of their health promotion work in the prevention of dental caries.¹¹ There is also some research which suggests that exposure to secondhand smoke in the home might increase the risk of dental caries in children.⁵⁰

Wound healing

Tobacco use is known to impair wound healing.^{51,52,53}

- Smokers have decreased levels of salivary and serum immunoglobulin which affects wound healing in the oral cavity and the mouth's ability to clear pathogens.¹¹
- Smokers have decreased blood oxygenation leading to decreased oxygen delivery to the tissues⁵⁴ which also impairs healing following oral surgery.
- The loss of the blood clot that follows the removal of teeth (referred to as dry sockets or localised osteitis) occurs four times more frequently in smokers than in non-smokers.⁵⁵
- There is also evidence which suggests that smoking inhibits healing through the effects of decreased oxygenation in the blood and tissues, and constriction of blood vessels.^{56,57}

Smokeless tobacco

Smokeless tobacco products are those that are chewed, sucked or inhaled. There is no scientific evidence that using smokeless tobacco can help a person quit smoking and smokeless tobacco is not a safer alternative to smoked tobacco products.^{58,59}

- The National Cancer Institute in the United States asserts that smokeless tobacco contains known carcinogens that increase the risk for oral cancer.^{60,61}
- The International Agency for Research on Cancer concluded that “there is sufficient evidence that use of smokeless tobacco is carcinogenic to humans.”⁶²
- The US Surgeon General’s 1986 report: The Health Consequences of Using Smokeless Tobacco concludes that the “oral use of smokeless tobacco represents a significant health risk” and further that “it is not a safe substitute for cigarette smoking, can cause cancer and a number of noncancerous oral conditions.”⁶³
- Cancer Research UK notes that there is good evidence that smokeless tobacco is a cause of oral and oesophageal cancers and that using smokeless tobacco products increases the risk of pancreatic and liver cancer as well as heart disease, and periodontal disease.⁶⁴

The use of smokeless tobacco is particularly common amongst south Asian communities, in particular chewing tobacco which is either chewed alone or with betel quid/paan.^{65,66} The use of these products can have a significant detrimental impact on the oral cavity. For further information about tobacco use among ethnic minorities see the ASH Fact sheet on [Tobacco and Ethnic Minorities](#) and Briefing on [tobacco use among minority ethnic populations](#) by the Race Equality Foundation.

- A systematic review of the health effects of smokeless tobacco use found that chewing betel quid and tobacco is associated with a substantial risk of oral cancer in India where the use of these products is high. The studies reviewed from the other countries where smokeless tobacco use is prevalent were not considered to be statistically significant but the researchers found that a positive association could not be ruled out.⁶⁷
- A case-control study of smokeless tobacco use amongst South Asians found a significantly increased risk of oesophageal cancer associated with the use of areca nut and betel quid when used with chewing tobacco.⁶⁸
- There is some evidence which suggests that the use of smokeless tobacco may be associated with an increased risk of pancreatic cancer.⁶⁹
- There is a strong association between chewing betel quid and oral leukoplakia.⁷⁰

There have been a number of investigations into the implications of smokeless tobacco on South Asian populations in the UK, the majority of which show that betel chewing is prevalent in many areas.^{71,72,73,74}

South Asian migrants to the UK have a higher risk of oral cancer compared to the native population.⁷⁵

- Betel-quid chewing with tobacco is carcinogenic to humans.⁷⁰
- The perception of the risk of getting cancer from betel / tobacco is low in many areas, so much so that it was recommended that a Government health warning should be attached to any betel sold within the UK.⁷⁶ It was found that many people, especially the young, were only concerned about betel / paan chewing in terms of its appearance on their mouths.⁷⁴
- Problems also arose because of the use of tobacco by a significant proportion of people as an aid to oral hygiene, for example through using toothpastes containing tobacco, and the fact that many had never visited a dentist.⁷⁷
- Chewing betel-quid/paan may also increase the risk of leukoplakia and periodontal diseases.^{78,79}

The 2011 Tobacco Control Plan for England recommends that services offering cessation support to users of smokeless tobacco be developed.⁸⁰ NICE Guidance is expected to be published in 2012.⁸¹

What can be done?

Dental and healthcare professionals have a crucial role to play in raising awareness of the dangers to oral health associated with smoking and the use of smokeless tobacco.^{82,83}

Smoking cessation

The most important step that smokers need to take to improve their oral health and minimise the risk of oral cancer is to stop smoking. Dentists can play a vital role in this process. Research has shown that smoking cessation works effectively and the NICE Guidance “Brief interventions and referral for smoking cessation in primary care and other settings” includes dentists in the list of healthcare professionals who should be offering routine stop smoking advice.⁸⁴ Dental staff interested in undertaking Level 1 Brief Intervention Stop Smoking Advice Training are encouraged to contact their local Stop Smoking Service. This training is free and provided by the NHS. Further information about the NHS stop smoking programme is available on the NHS Website: <http://smokefree.nhs.uk/>

There are 5 crucial steps in advising people to stop smoking:

- Ask
- Assess
- Advise
- Assist
- Arrange

Ask

Ask the patient if he/she smokes. This information should be recorded in the patient’s notes. Smoking status should be kept up to date.

Assess

Assess the patient’s willingness to quit as well as recording any previous quit attempts. This will help identify the best means of quitting.

Advise

Advise smokers to quit. Most smokers are aware of the dangers of smoking but may not appreciate the degree of risk. There is good evidence that brief advice by dental professionals is effective, particularly for users of smokeless tobacco.⁸⁵

Giving up smoking is the best thing that smokers can do to improve their health and many of them will have tried to stop in the past. Dentists should stress to patients who have made unsuccessful quit attempts that it is common to make several attempts before succeeding.

To help smokers overcome nicotine cravings, dentists can recommend following the “Four Ds”, aimed at reducing the urge to smoke:

- **Delay:** Don’t act on the urge to smoke by opening a pack or lighting a cigarette because even after a few minutes this urge will reduce.
- **Deep Breaths:** Take three deep, slow breaths in and out.
- **Drink water:** Sip it slowly and enjoy the taste.
- **Do something else:** Take your mind off smoking by doing some exercise, listen to music or go for a walk.

A quit date should be arranged during this brief advice session.

Assist

Discuss the benefits of various stop smoking aids such as Nicotine Replacement Therapy (NRT), Zyban (bupropion) or Champix (varenicline). Remind the patient that these pharmacotherapies are available on prescription.

Helplines

In England call 0800 022 4 332 Website: <http://smokefree.nhs.uk/>

In Wales: 0800 169 0 169 Website:

In Scotland: 0800 84 84 84 Website: www.canstopsmoking.com

N. Ireland: 0800 85 85 85 Website: www.spacetobreathe.org.uk

Isle of Man: 01624 642 404

Pregnancy helpline: 0800 169 0 169

There are a number of Asian language helplines available:

Bengali: 0800 169 0885

Gujarati: 0800 169 0884

Hindi: 0800 169 0883

Punjabi: 0800 169 0882

Urdu: 0800 169 0881

Arrange

Patients may also be referred to their local Stop Smoking Service. This is important since studies show that people are twice as likely to successfully quit by using the services compared to quitting without support.⁸⁶ Details of local services can be found on the NHS Stop Smoking Website: <http://smokefree.nhs.uk/>

The dentist should arrange a follow-up appointment to discuss the outcome or issues faced by the patient during the quitting process.

Conclusion

The dangers posed to oral health from smoking and chewing tobacco are well documented within the dental literature but the public's lack of knowledge of the risks is a concern. Dentists are encouraged to disseminate information on the subject as widely as possible and improve existing screening programmes to ensure that the public is made aware of these risks, especially those within high-risk groups. Given that the effects of many oral diseases are reversible, and more specifically that the survival rates for early diagnosed oral cancers are high, gives much ground for future optimism. However it is vital that more is done to ensure that public awareness of tobacco-related oral diseases continues to improve and more people are regularly screened. The combination of providing opportunistic advice, particularly to stop smoking, together with regular screening will reduce the overall morbidity and mortality from oral cancer and other mouth disorders, and will dramatically improve the quality of life of those people who are at greatest risk of these diseases.

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