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Tobacco Use and Periodontal Diseases: Background Information and Tools for Dental Hygiene Students

Abstract

Periodontal diseases in the US are widespread, destructive, bacterial infections influenced by a number of contributing factors. Tobacco use is a preventable but significant behavioral risk factor for developing periodontal diseases. Tobacco use affects the body's ability to fight infections and wreaks havoc on the oral cavity, but these ill effects can be halted upon tobacco cessation. Effective tobacco cessation interventions exist and are readily available to the student dental hygienist. It is the student's moral and professional responsibility to address tobacco use at every client visit. Two of the most invaluable exercises a student dental hygienist can perform are preparing and practicing tobacco cessation interventions prior to client visits. Assisting a client to quit tobacco may save the client's smile—and life.

**Tobacco Use and Periodontal Diseases:
Background Information and Tools for Dental Hygiene Students**

Maggie Curry-Chiu

March 2010

Periodontal diseases in the United States

Periodontal diseases are bacterial infections of all or part of the periodontium that includes the alveolar bone, periodontal ligament, cementum, and gingiva. The diseases range from reversible gingivitis to the more serious periodontitis that exhibits permanent tissue destruction (Nield-Gehrig & Willmann 2008). While several clinical definitions of periodontal diseases exist, most include a description of attachment loss. The United States (US) Surgeon General classified destructive periodontal disease as, “the presence of one or more sites with 4 mm or greater loss of tooth attachment to the surrounding periodontal tissues (USDHSS 2000).” The Johnson County Community College (JCCC) Department of Dental Hygiene classifies gingivitis as gingival inflammation with no attachment loss, slight periodontitis as less than 3 mm of attachment loss, moderate periodontitis as 3 to 4 mm of attachment loss, and advanced periodontitis as more than 5 mm of attachment loss (Callihan 2010). Periodontal disease is widespread in the US. According to the US Surgeon General, most adults have gingival inflammation and/or attachment loss (USDHHS 2000). Current government data finds 17.20% of seniors ages 65 and older and 8.52% of adults ages 20-64 to have destructive periodontal disease. Individuals who are older adults, Black, Hispanic, low income, less educated, or smokers are more likely to have periodontal diseases than the general US population (NIDCR 2008).

The etiology of periodontal diseases is always dental plaque biofilm, but many contributing factors affect the incidence of disease. Perry and Beemsterboer state, “Periodontal diseases are complex interactions of bacterial infection, host response, and patient behaviors (2007).” Host response factors that increase risk include genetic

influences and systemic conditions such as diabetes mellitus, osteoporosis, hormone alteration, psychological stress, HIV/AIDS, obesity, and heart disease. Patient behaviors that increase risk include diet, oral self-care, tobacco smoking, and alcohol consumption (Perry & Beemsterboer 2007). Of particular concern to the student dental hygienist are the behavioral risk factors that are one hundred percent preventable. This paper addresses how tobacco use contributes to periodontal diseases and how the student dental hygienist can address this preventable risk factor during patient education.

Tobacco use in the United States

Tobacco use in the US is unfortunately quite prevalent. According to the 2008 *National Survey on Drug Use and Health*, 28.4% of Americans aged 12 or older were current users of a tobacco product: 23.9% smoked cigarettes, 5.3% smoked cigars, 3.5% used smokeless tobacco, and .8% smoked tobacco in pipes. Interestingly, of those 28.4% of adult Americans who use tobacco, most are young people aged 18 to 25 at 41.4%. More tobacco users are male than female, and education level is inversely proportional to tobacco use. Nearly half of American Indian and Alaska Natives are tobacco users, and Asians and Hispanics are less likely to use tobacco than blacks, whites, or individuals of multiple races. While some cigarette smokers report infrequent tobacco use, most cigarette smokers are heavy users. Of American adult cigarette smokers, 61.7% reported smoking daily, and of those 61.7%, 49.1% reported smoking 16 or more cigarettes per day (USDHHS 2009).

Tobacco use may not continue to be so prevalent in the US. Of the estimated 70.9 million American adults who smoke, more than 70% want to quit. While few will succeed without help, the US Public Health Service reports that clinical treatment can

double the quitting success rate. All medical professionals are encouraged to support patients in tobacco cessation interventions: “There is no clinical treatment available today that can reduce illness, prevent death, and increase quality of life more than effective tobacco treatment interventions (USDHHS 2008).”

Tobacco use as a risk factor for periodontal disease

Tobacco use is a very strong behavioral risk factor for developing periodontal diseases. Tobacco smokers are 2.5 to 6 times more likely to develop periodontitis and more severe periodontitis than nonsmokers (Collins 2010 and AAP 2005). Smokeless tobacco users are 2 times more likely to develop periodontitis than nonusers (Fisher, Taylor, & Tilshalski 2005). As many as 41.9% of all current periodontitis cases and more than 90% of refractory periodontitis cases can be attributed to tobacco smoking (Collins 2010, Newman, Takei, & Carranza 2002, and AAP 2005).

Many but not all tobacco users will develop periodontal diseases because they result from a combination of factors. Collins states, “The onset and progression of periodontal disease depends on a number of factors and is determined by the host response, with lymphocytes, leukocytes, and the release of cytokines involved in this response (2010).” Some individuals have genes that increase the inflammatory response resulting in more periodontal destruction, while others have genes that seem to protect the periodontium against tobacco’s harmful effects (AAP 2005). Some tobacco users who practice impeccable oral self-care and who maintain an otherwise healthy lifestyle may be less susceptible. Table 1 summarizes how tobacco use contributes to periodontal diseases.

Table 1. Tobacco's contributions to periodontal diseases
increases calculus formation
increases the ratio of pathogenic species of bacteria in the periodontium
increases the tissue-destructive effects of toxins released by bacteria
increases the tissue-destructive processes of the inflammatory response
decreases function of granulocytes
increases vasoconstriction and clotting
decreases tissues' ability to heal
decreases saliva production
increases genetic mutations in cells
Source: Collins 2010, Fisher et al. 2005, Newman et al. 2002, Perry & Beemsterboer 2007, and Moraitis et al. 2005

Tobacco use as a risk factor for other oral diseases

It is well-known that tobacco's harmful effects to the oral cavity are not limited to periodontal diseases. The student dental hygienist should be aware that tobacco use contributes to other oral health concerns including leukoplakia hyperkeratosis, nicotine stomatitis, lichen planus, and tooth loss. Any discussion of tobacco and oral health must include oral cancer. Alarming, Collins states, "Oral cancer risk for smokers is at least 6 times higher than for nonsmokers, and for chew/spit tobacco users the risk of cancer of the cheek and gingivae has been found to increase 50-fold over that of nonusers. 75% of oral cancer is related to tobacco use. Amongst cigar smokers there is a 7- to 10-fold increased risk of oral cancer, while for pipe smokers the risk is 2 to 3.5 times greater... The 5-year relative survival rate [for oral cancer] is just 59% (2010)." It is outside the scope of this essay to describe tobacco's effects on the whole body. It is worth noting,

however, that according to the US Public Health Service, “Tobacco is the single greatest cause of disease and premature death in America today (USDHHS 2009).”

Evidence-based tobacco cessation interventions

Many individuals have tried to quit tobacco repeatedly without success. Those who try to quit alone without any physiological support are the least likely to succeed (Collins 2010). The advice of a health care professional can more than double smoking cessation success rates (ADHA 2004). Because a combination of psychological and physiological interventions tailored to the individual proves to be the most effective in tobacco cessation, the US Public Health Service developed the 5As tobacco cessation program for clinicians: Ask, Advise, Assess, Assist, and Arrange (USDHSS 2009). All health care providers should include tobacco cessation counseling in routine practice. Dental offices that incorporate a tobacco cessation program such as the 5As can anticipate a 10 to 15% quit rate (Collins 2010).

Psychological interventions include individual counseling and support groups. The clinician can do the counseling, or the clinician can refer the patient to a telephone hotline such as 1-800-QUIT-NOW, counselor, or online support group such as www.smokefree.gov. Because only 24% of employer-provided health insurance offers any tobacco treatment coverage, it is imperative that every clinician be able to counsel patients and refer them to free or low-cost resources (USDHSS 2003). Smokers are more likely to use telephone counseling than to participate in individual or group counseling sessions (USDHHS 2009). The student dental hygienist should note that face-to-face counseling and interactive telephone counseling are more effective than simply providing educational or self-help materials such as pamphlets (USDHSS 2009). Furthermore, the

multiple visits required for treatment at a learning institution offer the perfect framework for regular follow-up face-to-face counseling.

Physiological interventions include nicotine replacement therapy (NRT) and antidepressant medications. NRT gums, lozenges, and patches are commonly available without a prescription. NRT products are designed with different concentrations of nicotine so that the patient can more readily wean. Prescription NRT inhalers and nasal sprays are available to help the patient cope with withdrawal. The two prescription antidepressant medications used for tobacco cessation are bupropion (available as generic, Zyban, or Wellbutrin) and varenicline (available as Chantix) (USDHHS 2009). Quit rates at 1 year for varenicline, bupropion, and a placebo in combination with weekly support counseling were 23%, 14.6%, and 10.3%, respectively (Collins 2010). While student dental hygienists are not in a position to prescribe medications, they will work on a team with dentists and a referral network to assist patients with tobacco cessation.

The student dental hygienist's professional and moral responsibility

The student dental hygienist has access to the background knowledge and tools to address tobacco cessation and prevention. He or she is called to action by nearly every health agency in the US. According to the JCCC Dental Hygiene Department's primary text, "Because tobacco use is life threatening, it is ethically and morally sound to use scientifically established, brief, effective tobacco prevention and cessation services routinely with every patient (Daniel et al. 2008)" According to the American Dental Hygienists' Association (ADHA), "The ADHA continues to advocate the efforts of all dental hygienists who regularly perform the 5As within their clinical practices (2004)." According to the *Healthy People 2010* objectives, "Dental personnel also need to provide

counseling to patients to stop tobacco use and limit alcohol use, both of which are associated with oral and pharyngeal cancers (2001).”

Tobacco cessation is difficult and even painful for clients. As caregivers, student dental hygienists are morally obligated to prepare to help their clients through the tobacco cessation process. After studying the principles of the 5As program, the student dental hygienist may benefit from role playing exercises and collecting resources in advance of client visits. In addition to thoroughly reviewing the 5As program, the student dental hygienist can become a better counselor by building empathy with tobacco users. To build empathy, dental hygiene students should be aware of the negative symptoms of nicotine withdrawal: dysphoric or depressed mood, insomnia, irritability, frustration, anger, anxiety, difficulty concentrating, restlessness, decreased heart rate, and increased appetite or weight gain (Daniel, Harfst, & Wilder 2008). Dental hygiene students should advise patients who are quitting tobacco that they may see an increase in aphthous ulcers (Collins 2010), increased gingival inflammation, and/or gingival bleeding for several months as the immune response returns to normal (Nield-Gehrig & Willmann 2008). The student can, however, emphasize the benefits of tobacco cessation that greatly outweigh the temporary drawbacks. After 12 hours, there is no further tobacco staining of teeth. After 1 to 9 months, there is an improved response to periodontal therapy. After 1 year, there is reduced risk of tooth loss and reduced probing depths. After 5 years, there is a 50% reduced risk of oral and esophageal cancer. After 6 years, the risk of periodontal diseases is equal to that of non-smokers. After 15 years, the risk of tooth loss is the same as a non-smoker (Collins 2010). Indeed, counseling and referral efforts by dental hygiene students can be effective. Research shows that, “individual, group, and telephone

counseling are effective, and their effectiveness increases with treatment intensity (USDHSS 2009).” For further information, student dental hygienists may refer to the US Public Health Service’ *Treating Tobacco Use and Dependence: Quick Reference Guide for Clinicians, 2008 update* attached to this document.

Summary

Periodontal diseases in the US are widespread, destructive, bacterial infections influenced by a number of contributing factors. Tobacco use is a preventable but significant behavioral risk factor for developing periodontal diseases. Tobacco use affects the body’s ability to fight infections and wreaks havoc on the oral cavity, but these ill effects can be halted upon tobacco cessation. Effective tobacco cessation interventions exist and are readily available to the student dental hygienist. It is the student’s moral and professional responsibility to address tobacco use at every client visit. Two of the most invaluable exercises a student dental hygienist can perform are preparing and practicing tobacco cessation interventions prior to client visits. Assisting a client to quit tobacco may save the client’s smile—and life.

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