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TOBACCO CONTROL FOR ADOLESCENTS IN U.S. PEDIATRIC DENTAL PRACTICES

by

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THESIS

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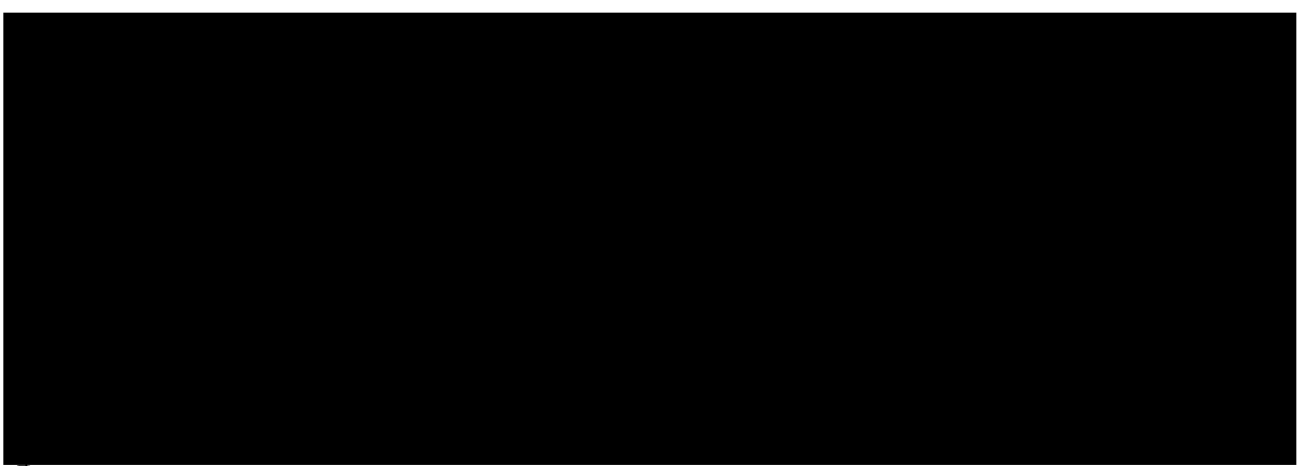

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TOBACCO CONTROL FOR ADOLESCENTS IN U.S. PEDIATRIC DENTAL PRACTICES

Jennifer L. Ryan, D.D.S.

ABSTRACT

Tobacco use is the single most preventable cause of premature disease and death in the United States. Tobacco use almost always begins during adolescence, and is increasing among adolescents, with approximately 3,000 children under age 18 becoming regular smokers every day. Since pediatric dentists come in frequent contact with adolescents, they have an opportunity to prevent and diminish adolescent tobacco use. However, the services pediatric dentists currently provide, and their attitudes regarding tobacco use prevention and cessation, are unknown.

The specific aims of this study were: (1) to characterize the practices, attitudes, and knowledge of pediatric dentists related to tobacco use prevention and cessation for adolescents in their practices; (2) to identify barriers to the implementation of tobacco use prevention and cessation; (3) to identify methods of tobacco use prevention and cessation education that pediatric dentists would be willing to participate in or provide; and (4) to identify predictors of tobacco use prevention and cessation services in pediatric dental practices.

We hypothesized that certain variables predict pediatric dentists' participation in tobacco use prevention or cessation services, and that pediatric dentists are willing to provide tobacco prevention and cessation services. A survey and cover letter were sent to

a national, random sample of 1,500 members of the American Academy of Pediatric Dentistry. A second survey was then mailed to non-respondents. A random sample of pediatric dentists who did not respond to either mailing was contacted by telephone for a brief interview.

The data were analyzed using Epi Info and the statistical software program SAS©. Data were tested using the Chi-Squared statistic. Spearman Rank Correlations were done, and Stepwise Logistic Regression Models were carried out providing odds ratios and 95% confidence intervals, all with $p \leq 0.05$ indicating significance.

Although pediatric dentists are not universally involved in tobacco use prevention, when they have adolescents in their practices who use tobacco, they are likely to advise cessation. Pediatric dentists are less involved in assisting users with quitting. Results from this study indicate that pediatric dentists are in need of intervention to train them in tobacco cessation techniques, and are interested in obtaining such information.

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I. SPECIFIC AIMS, HYPOTHESES, SIGNIFICANCE AND BACKGROUND

A. SPECIFIC AIMS AND HYPOTHESES

This study is a survey of pediatric dentists in the United States. It was conducted to determine the practices, attitudes, and knowledge of pediatric dentists related to tobacco use prevention and cessation for adolescents in their practices. The study had the following specific aims:

1) To generate descriptive statistics to describe the overall study sample and, specifically, to characterize pediatric dentists' practices, attitudes, and knowledge related to tobacco use prevention and cessation among adolescent patients (ages 11-17) in their practices.

2) To identify barriers to the implementation of tobacco use prevention and cessation. We hypothesized that:
   a. The biggest barrier will have at least 75% of respondents reporting that it is at least somewhat of a barrier.
   b. Lack of time will be the major barrier identified.
   c. A feeling of less preparation to ask, advise, or assist tobacco users will be negatively associated with the implementation of each respective practice.
   d. Perception of importance with regard to tobacco use prevention or cessation practices will be associated with the implementation of the respective practice.

3) To identify methods of tobacco use prevention and cessation education that pediatric dentists would be willing to participate in or provide. Based on the Healthy People 2000 Objective, (•Healthy people 2000, 1990) we hypothesized that:

   a. At least 75% of respondents who do not already ask, encourage, or provide materials for **non-users** will indicate a willingness to provide the respective service to their adolescent patients.

   b. At least 75% of respondents who do not already advise, discuss, encourage, provide materials, refer, and provide follow-up will indicate a willingness to provide the respective service to their adolescent **tobacco users**.

   c. Fewer than 75% of respondents who do not already recommend nicotine gum or patches will indicate a willingness to provide the respective service to their adolescent **tobacco users**.

   d. Fewer than 75% of respondents with no previous tobacco use prevention or cessation training will indicate a willingness to receive such training.

4) To identify predictors related to the delivery of tobacco use prevention and cessation services in pediatric dental practices. We hypothesized that provision of tobacco use services will be predicted by year of graduation from dental school, geographic location, amount of state cigarette tax, statewide prevalence of adult smoking, health care provider tobacco use, training in tobacco intervention strategies (previous training and willingness to receive training), intervention self-efficacy (feeling of preparedness to ask, advise, and assist tobacco users), and attitude.

B. SIGNIFICANCE

The use of tobacco among adolescents is increasing. This puts them at risk for adverse health effects, including oral cancer, lung cancer, and cardiovascular disease. (•US DHHS,1994) Pediatric dentists come in frequent contact with adolescents and have an opportunity to both prevent adolescent tobacco use, and to encourage adolescents who use tobacco to stop. In order to develop interventions in which pediatric dentists could participate, an understanding of pediatric dentists' practices, attitudes, and knowledge in regard to tobacco use prevention and cessation for adolescents in their practices is necessary.

One of the goals of the US Department of Health and Human Services Healthy People 2000 Objectives is to "increase to at least 75% the proportion of primary care and oral health care providers who routinely advise cessation and provide assistance and follow-up for all of their tobacco-using patients". (• Healthy People 2000, 1990) The results of this study will provide baseline data to measure our progress toward achieving this Healthy People 2000 objective.

C. INTRODUCTION

Smoking and smokeless tobacco use almost always begin and are established during adolescence. (•US DHHS,1994) The younger one is when one begins to smoke or use smokeless tobacco, the more likely it is that this person will be a current smoker or smokeless tobacco user as an adult. Approximately 80% of adult smokers started smoking before the age of 18. Among U.S. adults who have ever smoked daily, 91%

tried their first cigarette and 77% became daily smokers before the age of 20. Among high school seniors who have ever tried smokeless tobacco, 73% did so by ninth grade. (•US DHHS,1994) It is not uncommon for young boys to start habitual dipping, chewing, or both in elementary school. (• Christen, 1980) Therefore, the longer adolescents are tobacco-free, the greater the chance they will never start using tobacco. (•US DHHS,1994)

Overall, about one-third of high school aged adolescents in the U.S. smoke or use smokeless tobacco. Every day, nearly 3,000 people under the age of 18 become regular smokers. One third of these new smokers will eventually die of tobacco-related diseases. Currently, more than 3 million people under the age of 18 smoke half a billion cigarettes each year, and more than half of them consider themselves to be dependent upon cigarettes. (•US DHHS,1994)

Smokers who begin tobacco use as younger adolescents are more likely to be heavy tobacco users. Heavy users are more likely to have tobacco-related health problems, and are less likely to quit using tobacco. (•US DHHS,1994)

Most smokeless tobacco users begin the habit because of the influence of family and friends. (• Schroeder, 1988) One study found that 63% of smokeless tobacco users learned about smokeless tobacco from peers, and 24% learned about it from friends or relatives. (• Guggenheimer, 1986)

Preadolescent tobacco use is predicted by the presence of oppositional defiant disorder (e.g. rebelliousness) and the absence of anxiety disorders. Furthermore, preadolescent tobacco use is more prevalent among children whose parents have substance use disorders, (•Clark, 1998) and among children whose parents use tobacco. Parental tobacco use, however, is not as compelling a risk factor as peer tobacco use. (•US DHHS, 1994) Young people from families with lower socioeconomic status, including adolescents living in single-parent homes, are at increased risk of initiating tobacco use. (•US DHHS, 1994)

Risk factors for adolescent tobacco use include lower levels of achievement in school than peers, lower self-image, and fewer skills to resist the influences to use tobacco. (•US DHHS,1994) Smoking is twice as prevalent among high school girls who do not intend to complete 4 years of college as it is among those who plan to get a bachelor's degree (29.0% vs. 13.3%). (•Fiore, 1990) Poor academic achievement is correlated early on with aggressive behavior. Among boys, aggressive or disruptive classroom behavior (e.g. breaking rules and fighting), as early as first grade, predicts later tobacco use. Interventions in schools targeting aggressive and disruptive classroom behavior among first and second grade boys have decreased their rates of smoking initiation as adolescents. (•Kellam, 1998)

Adolescents' perceptions of the number of young people and adults who smoke influence their behavior as well: those with overestimates are more likely to become smokers than those with more accurate estimates. For example, middle school students who smoke

estimated that 49% of boys smoke, while nonsmokers estimated that 27% of boys smoke, a difference of 22%. (•Sherman, 1983) In 1983, the percentage of adult smokers was 27%. (•MMWR, 35(47), 1985) Another study involving 5,610 students from the Los Angeles area found that while 9% and 12% of eighth and ninth graders, respectively, were regular smokers, students who were regular smokers estimated that 55% of their student peers smoke regularly. And while 33% of adults were reported to be smokers at that time, the students who were regular smokers estimated the figure to be approximately 70%. Most importantly, the study also found that inflated estimates among non-smokers were significantly associated with future onset of smoking. (•Sussman, 1988) Likewise, adolescents who perceive that cigarettes are easily accessible are more likely to begin smoking than those who perceive that it is more difficult to obtain cigarettes. (•US DHHS, 1994)

Because adolescents are at such high risk for initiating tobacco use, and because almost all adult tobacco users begin to use during adolescence, health care providers who see adolescents on a regular basis, such as pediatric dentists, are ideally positioned to intervene and prevent adolescent tobacco use. In addition, pediatric dentists who see preadolescent patients have the opportunity to send a positive message about abstaining from tobacco use before it becomes an issue.

1. Tobacco as a Gateway Drug

Tobacco is a gateway drug. This means that in addition to its direct harm, tobacco use may be a portal to other substance abuse and an indicator of the likelihood for other

health-compromising behaviors. Tobacco is generally the first drug young people use, and other drug use rarely occurs before tobacco use. (•Clark, 1998)

Teenagers who smoke are three times more likely than nonsmokers to use alcohol, eight times more likely to use marijuana, and 22 times more likely to use cocaine. (•US DHHS, 1994) In one study of 20,000 children and adolescents, those who smoked one pack per day, every day, were three times more likely to drink alcohol, seven times more likely to use smokeless tobacco, and, depending upon the drug, ten to 30 times more likely to use illegal drugs than were nonsmokers. There was also a strong dose-dependent relationship found between the amount of tobacco use and the amount of use of alcohol and illegal drugs. (•Torabi, 1993) Therefore, pediatric dentists who contribute to the prevention of children's tobacco initiation may help to reduce initiation rates of marijuana and harder drugs. (•US DHHS, 1994)

2. Prevalence of Tobacco Use

a. Prevalence of Cigarette Use

Despite the health risks attributed to smoking, 23.5% of Americans over the age of 18 smoke (27.0% of men and 22.6% of women). (•CDC, 46(51), 1997) While just 13% of those over the age of 65 smoke, almost 25% of those between ages 18 to 24 smoke, (•CDC, 46(51), 1997) and approximately 25% of 17- and 18-year-olds smoke. (•US DHHS, 1994)

Adult tobacco use had been decreasing for the past 3 decades (from 42.4% in 1965 to 25.5% in 1990), (•CDC, 43(50), 1994) but has been almost unchanged from 1990 to the present. (•CDC 43(19), 1994; •CDC, 43(50), 1994; •CDC, 45(27), 1996; •CDC, 46(51), 1997) However, since 1991, adolescent tobacco use has been increasing. (•Kann, 1998) Among youth in grades 9-12, more than one-third (36.4%) reported smoking in the past month, while 16.7% were frequent smokers (smoked 20+ days in the past month). Male and female adolescents (grades 9-12) were almost equally as likely to smoke: among boys, 37.7% had smoked in the past month and 17.6% were frequent smokers, while among girls, 34.7% had smoked in the past month and 15.7% were frequent smokers. White students were significantly more likely than Hispanic and African-American students to report cigarette use. White female students reported the highest rates of cigarette use: 39.9% smoked in the past month and 20.1% reported frequent cigarette use. (•Kann, 1998)

As many as three quarters of adolescents try cigarettes at least once, and about half of those adolescents who try cigarettes experiment on a regular basis (at least once a month). (•Perez-Stable, 1998) The mean age (no median reported) for the first use of cigarettes has been reported as 15 years, and the mean age for becoming a daily smoker, 18 years. (•Lynch, p.3-25, 1994) Almost one quarter of students (24.8%) have smoked a whole cigarette before 13 years of age. (•Kann, 1998)

Therefore, if pediatric dentists are to successfully prevent their patients from initiating tobacco use, they need to begin when their patients are preadolescents. Because most

adult smokers start smoking before the age of 18, pediatric dentists have an opportunity to influence the future rate of adult smoking by influencing their preadolescent and adolescent patients today.

b. Prevalence of Smokeless Tobacco Use

Despite a decline in the use of smokeless tobacco from the beginning of the 20th century to around 1960, an increase in smokeless tobacco use, particularly moist snuff, began in the early 1970s. (•Connolly, 1986) The percentage of U.S. males age 18 or older who use smokeless tobacco almost tripled from 1970 to 1991, with the largest increase seen in males ages 18 to 24. (•CDC, Interview Survey, 1970,1987,1991) There has also been an increase in the use of smokeless tobacco among teenagers in recent years. (•Schroeder, 1988) One of the reasons for this increase in use was heavy promotion of moist snuff by the tobacco industry. For example, in 1983, one manufacturer spent $6.8 million on promotion of a new brand of moist snuff sold in "tea-bag" pouches. In a 1983 survey, this product was ranked as the 3rd most recognized brand-name tobacco product in the U.S., the first time a non-cigarette ranked that high. (• Connolly, 1986)

The 1986 Surgeon General's Report *The Health Consequences of Using Smokeless Tobacco* indicated that there are approximately 12 million smokeless tobacco users, (•US DHHS, 1986) - of whom more than one million are adolescent males. (•US DHHS, 1994)

Smokeless tobacco use is primarily restricted to males. (•Severson, Psychosocial, 1990) In 1993, 2.1% of U.S. adults over the age of 18 used smokeless tobacco, with 4.0% of

men using regularly and 0.4% of women using regularly. (•Arday, 1997) Among male and female youth between ages 12-17 throughout the U.S., almost 10% use smokeless tobacco regularly, (•Kann, 1998; Kleinman, 1994) with 15.8% of boys and 1.5% of girls reporting regular use. White males (20.6%) are significantly more likely to use smokeless tobacco than are Hispanic and African-American males (8.3% and 3.2%, respectively). (•Kann, 1998)

Throughout the United States, rates of smokeless tobacco use by high school males vary. Some areas report rates of use between 20% and 36%. Higher prevalence has been reported in rural areas than in urban ones; in Native American groups, and, as previously noted, among white males, than among African-American, Asian, or Hispanic males. (•Kann, 1998; •Severson, Psychosocial, 1990)

In a summary of data compiled from over 43,000 students in grades 4 through 11 in 16 locations in the U.S. and Canada, between 40% and 60% of males had tried smokeless tobacco. In most locations approximately 20% of the older male youths reported recent use (at least once in the past month). (•Severson, Psychosocial, 1990) Another study found a 10% rate of use in more than 1,000 randomly sampled metropolitan Denver high school boys and girls. Again, use by girls was minimal, but use by boys was approximately 20%. (•Greer, 1983) A study of smokeless tobacco use in over 900 high school students in Arkansas found that 36% of males and 2% of females used smokeless tobacco. Responses indicated that if smokeless tobacco was used at all, it was used on almost a daily basis. (• Marty, 1986)

Rates of smokeless tobacco use by children not yet in high school are almost as high as rates among high school adolescents. Between 1976 and 1982, an increase in snuff use from 7% to 32% was documented among white 12 to 13 year old boys in Bogalusa, Louisiana. Product advertising, peer pressure, and restrictions against smoking were cited as reasons for the increased use. (•Hunter, 1986)

The mean age (median not given) for first use of smokeless tobacco has been reported as 11 years. (•Severson, Psychosocial, 1990) A bimodal curve has been observed showing that adolescents around age 12, and again around age 18, are at high risk for the initiation of smokeless tobacco use. The younger initiators are primarily from rural areas, and are influenced by their parents or families to begin using chewing tobacco. Those who initiate use around age 18 are primarily from more urban areas, and are mainly influenced by their peers to begin using snuff. (•Schroeder, 1987)

For children and adolescents, starting the smokeless tobacco habit at an early age presents the dual problem of the development of a chronic habit of use, which years later may cause severe consequences, and the possibility of a change in form of tobacco use to cigarettes or other smoked tobacco products. (•Belanger, 1983) Young smokeless tobacco users may switch to cigarette smoking as they grow older. A survey of 1,281 elementary school children in Washington State found that two-thirds of the smokeless tobacco users took up smoking over a two year period, compared to just 13% of the non-smokeless tobacco users. Despite tobacco industry advertising, the use of smokeless tobacco is not a safe alternative to smoking. (•Connolly, 1986)

The increased popularity of smokeless tobacco is part of a cycle between smokeless tobacco and cigarette use that has occurred before. As a variety of societal forces combine, one form of tobacco replaces another. (•Christen, 1982) One of the societal forces that may be contributing to the current increase in the use of smokeless tobacco is the image created in the media that smokeless products are harmless, or are at least safer than cigarettes. (•Christen, 1982; •Christen, 1980) Additionally, advertisers have designed their smokeless tobacco advertising campaigns to appeal to elementary and high school students and athletes. (•Christen, 1980)

Effective interventions, such as controlling the promotion and distribution of tobacco products (•Christen, 1982) and supporting public education about tobacco use (•Connolly, 1986), can interrupt this cycle of popularity between cigarettes and smokeless tobacco. Given that pediatric dentists provide oral health care to adolescents on an ongoing basis, and that adolescents are at high risk for smokeless tobacco use, it is important to determine the extent to which pediatric dentists are involved in tobacco control efforts.

3. Perceptions Among Adolescents and Parents of Tobacco Use

Despite the widely publicized risks of tobacco use, there remains a low level of understanding among children and adolescents about the harmful consequences of its use. (•US DHHS, 1994) This underscores the need for health care providers, particularly those who interact with children and adolescents on a regular basis, such as pediatric

dentists, to provide children and adolescents with information to counter the allure of tobacco use.

Waldman (1998) reports that "...at least 90 percent of fourth-to-sixth graders consider marijuana and crack / cocaine to be drugs...less than half of these schoolchildren, however, believe that alcohol (beer, wine or liquor) or cigarettes were drugs..." (• Waldman, 1998) Similarly, in a 1993 survey, only 61% of high school sophomores believed that the risk from cigarette smoking was "great", while just 44% believed that the risk from smokeless tobacco was "great". (•US DHHS, 1994) Another survey found that 59% of youth were unaware of the health risks of dipping and chewing, and that 86% regarded smokeless tobacco as a safe alternative to cigarette smoking. (•Severson, Psychosocial, 1990)

While children tend to be unaware of the harmful effects of tobacco use, parents are largely ignorant of the extent to which their adolescent children are involved in tobacco use. In a confidential survey (n = 194) administered separately to middle school students and their parents, parents dramatically underestimated the prevalence of tobacco use among their children. While almost half (48%) of the students admitted tobacco use, only 14% of parents suspected tobacco use among their children. (•Young, 1998)

If parents are ignorant of their children's tobacco use, they may show apathy toward programs designed to prevent tobacco use. Educating parents in this area encourages them to support health education programs and other preventive programs in schools and

communities. (•Young, 1998) In the same manner, if pediatric dentists do not realize that their patients are using tobacco, they, too, may show apathy toward participation in programs in their offices to prevent and diminish adolescent tobacco use. This may provide us with a clue as to why many pediatric dentists are not involved in the prevention of tobacco use: they do not believe tobacco use to be a problem among their patients.

D. HEALTH CONSEQUENCES OF TOBACCO USE

1. Introduction

Each year in the United States, tobacco use kills more people than AIDS, alcohol, drug abuse, car crashes, murders, suicides, and fires combined. (•CDC, 42(44), 1993) Tobacco use is the single most preventable cause of premature death in the United States, annually causing over 430,000 deaths. This represents 20-25% of all deaths in the United States, approximately 20% of all cardiovascular deaths, and approximately 30% of all deaths due to cancer. (•CDC, 42(33), 1993; •Carbone, 1992) Passive smoking is the third leading cause of death in the U.S. (•Goldman, 1998)

Smoked and smokeless tobacco use produce profound effects on the hard and soft tissues in the oral and perioral environment. Tobacco use is linked with a wide range of malignant and precancerous changes in and around the oral cavity. Because many of the oral and perioral effects of tobacco use are clinically observable, dentists are in an ideal position to advise patients of the negative health effects of tobacco use. (•Christen, 1992)

Both smoked and smokeless tobacco use are contributing factors in the development of periodontal disease. Smokers are likely to have more severe periodontal disease than nonsmokers, and both types of tobacco use can contribute to bone and tooth loss. (•Christen, 1990; •Belanger, 1983) The use of smokeless tobacco, including use by young people, is associated with periodontal degeneration and oral soft tissue lesions. (•US DHHS, 1994)

Other oral conditions, which are causally, related to tobacco use are discoloration or staining of teeth and composite restorations, increased formation of dental calculus, hairy tongue, acute necrotizing ulcerative gingivitis (ANUG), halitosis, and abrasion. (•Christen, 1990) Tobacco use is a causal factor in the development of nicotine stomatitis, gingival bleeding, and gingival recession. (• Campbell, 1999) Tobacco use dulls the user's ability to taste and smell bitter, salty, and sweet foods. Smokeless tobacco use, particularly, causes increased abrasion of the incisal and occlusal tooth surfaces because of its high levels of abrasive grit. (•Christen, 1980) The severity of these conditions is usually directly related to the amount of tobacco used and the duration of usage. (•Christen, 1990)

In addition to these concrete health effects, adolescent tobacco users are more likely than non-users to engage in a myriad of undesirable and often illegal behaviors. Adolescent tobacco users are more likely than non-users to use alcohol and illegal drugs, attempt suicide, engage in high-risk sexual behaviors and fights, and carry weapons. (•US DHHS, 1994) Because pediatric dentists provide oral health care to adolescents on a regular

basis, they are in an important position to pass on information about the negative health effects of tobacco use, and to contribute to tobacco control efforts targeting adolescents.

2. Cigarette Use

Cigarette use causes heart disease, lung and esophageal cancer, and chronic lung disease. It contributes to cancers of the oral cavity, pharynx, larynx, bladder, urinary tract, pancreas, and kidney, as well as to atherosclerosis and coronary heart disease, chronic obstructive pulmonary disease (COPD), and strokes. (•CDC, 42(44), 1993; •Carbone, 1992; •Christen, 1990) Cigarette use is associated with a two- to four-fold increased risk of coronary heart disease. (•Lakier, 1992) It is implicated in the risk of leukemia and myeloma, (•Carbone, 1992) and is a major risk factor for coronary and peripheral vascular disease, peptic ulcers, reproductive disorders, and neuromuscular disease. (•US DHHS, 1986) A higher risk of stroke and stroke-related mortality has been observed in smokers than in nonsmokers, and cigarette use has been implicated in the development of cor pulmonale. (•Lakier, 1992)

Compared to nonsmokers, male smokers increase their risk of death from lung cancer by more than 22 times, and female smokers by nearly 12 times. From 1960 to 1990, deaths among women from lung cancer increased by more than 400%. Lung cancer recently surpassed breast cancer as the leading cause of cancer-related death among women. (•CDC, 42(44), 1993) Smokers increase their risk of death from bronchitis and emphysema by approximately 10 times compared to nonsmokers. For middle-aged men and women, smoking triples the risk of dying from heart disease. (•CDC, 42(33), 1993)

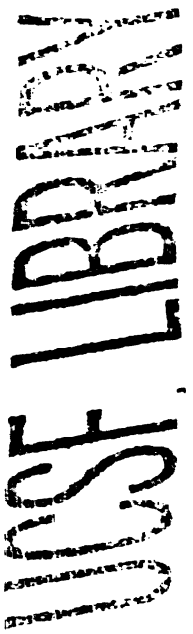
Compared to nonsmokers, men who smoke have 27 times the risk of dying from oral cancer and women have 6 times the risk. (•Davis, 1990) Approximately 70% of all deaths from oral cancer are associated with tobacco use. (•CDC, 1992) Oral cancer makes up 3% of all cancers in the United States, (•Connolly, 1986) and is diagnosed in approximately 30,000 new cases annually. It is responsible for approximately 8,000 deaths annually. (• Connolly, 1986; •CDC, 1992) The five year survival rate for people with oral cancer is 53%, although survival varies with stage at diagnosis. Oral examination to detect oral cancer can reduce morbidity and mortality from this disease. (•CDC, 1992)

Cigarette smoking causes reduced ability for wound repair throughout the body. (•Silverstein, 1992) This is of particular concern in the mouth, where delayed wound healing places the prognosis for many dental procedures at risk. (•Jones, 1992; •Christen, 1990) Dry socket, with the accompanying loss of the blood clot which forms after an extraction, occurs four times more often among smokers than among nonsmokers. Cigarette smoking also depresses the body's immune system by reducing the level of circulating antibodies. (•Christen, 1990) Sinusitis, an inflammation of the tissues lining the maxillary and frontal sinus air spaces, occurs approximately 75% more often among smokers than among nonsmokers. (•Christen, 1990)

Women who smoke during pregnancy are more likely than nonsmokers to have adverse birth outcomes, including low birth weight babies. Low birth weight is a leading cause of

death among infants. (•CDC website (2), 1999) Women who smoke while pregnant are also at an increased risk of having infants with congenital malformations, and having spontaneous abortions. (•Perez-Stable, 1998)

Known by various names, passive, involuntary, secondhand, or environmental tobacco smoke kills approximately 53,000 nonsmokers a year. It ranks behind direct smoking and alcohol abuse as the third leading preventable cause of death in the United States. Environmental tobacco smoke contributes to eye and throat irritation, headache, rhinitis, and coughing among healthy nonsmokers, with more intense effects seen among infants and children. (•Lesmes, passive, 1992) Results of epidemiologic studies provide evidence that exposure of children to environmental tobacco smoke is associated with increased rates of lower respiratory illness, middle ear effusion, asthma and sudden infant death syndrome. (•American Academy of Pediatrics, 1997) Exposure to environmental tobacco smoke can cause an increase in emergency department visits and hospital admissions. (•Beeber, 1996)



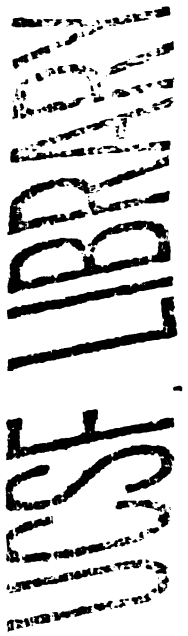
Exposure to environmental tobacco smoke during childhood may also be associated with development of cancer during adulthood. (•American Academy of Pediatrics, 1997) The relative risk for healthy children of developing laryngospasm during general anesthesia is 10 times higher in those children exposed to environmental tobacco smoke compared with those not exposed. (•Lakshmipathy, 1996)

Adolescent tobacco users may be unaware of the adverse effects of environmental tobacco smoke on others around them, and brief counseling by pediatric dentists could increase their social consciousness with regard to the ill effects of this smoke. For young people, the short-term effects of smoking include halitosis, unpleasant smell, (•Fiore, 1990) poor physical fitness, damage to the respiratory system, addiction to nicotine, and the associated risk of other drug use. (•US DHHS, 1994) Young smokers are likely to be less physically fit than young nonsmokers: smoking hurts young people's physical fitness in terms of both performance and endurance. Smoking among young people can hamper both the rate of lung growth and the level of maximum lung function that can be achieved. The resting heart rates of young adult smokers are 2-3 bpm faster than those of nonsmokers, (•US DHHS, 1994) and young smokers are more likely to suffer from shortness of breath. (•Fiore, 1990)

In addition, regular smoking among young people is responsible for increased severity and frequency of respiratory illnesses during adolescence. These illnesses are risk factors for other chronic conditions in adulthood, including COPD. Atherosclerosis can also begin in childhood: smoking by children and adolescents is associated with an increased risk of early atherosclerotic lesions and increased risk factors for cardiovascular disease as adults. (•US DHHS, 1994) For children with asthma, cigarette smoke is an airway irritant and can increase the frequency and severity of respiratory symptoms. (•Zhu, 1996)

Long term health consequences of youth smoking are reinforced by the fact that adolescent tobacco users are likely to continue to smoke throughout adulthood. (•US

DHHS, 1994) Over 5 million youth in the United States are projected to die prematurely from their smoking. (•CDC, 45(44), 1996) A recent study found that smokers who begin as adolescents are more likely than those who start as adults to wind up with severe damage to the DNA in their lungs and blood, and that it will take longer for their cells to repair the damage even after they have quit smoking. The most significant factor contributing to DNA damage among the patients who had quit smoking was not whether they had been heavy or light smokers, or how long they had used, but rather how old they were when they began the habit. (•Wiencke, 1999)



Although young people are generally aware of the serious, long-term health risks associated with tobacco use, and are aware that nicotine is addictive, those who smoke do not usually view those risks as applying to them personally, and do not believe that they will become addicted. (•Paralusz, 1998) Pediatric dentists have an opportunity to point out visible oral health effects associated with smoking, and thus enhance a feeling of personal susceptibility among their adolescent patients.

3. Smokeless Tobacco Use

Smokeless tobacco use is causally related to the incidence of cancers of the oral cavity, pharynx, larynx, and esophagus. (•US DHHS, 1994; Christen, 1982) One author has documented 646 cases of oral, pharyngeal, and laryngeal cancer which are directly linked to smokeless tobacco use. Verrucous carcinoma is related to the use of smokeless tobacco, (•Christen, 1980) and smokeless tobacco is a major risk factor for coronary and

peripheral vascular disease, peptic ulcers, reproductive disorders, and neuromuscular disease. (US DHHS, 1986)

Three types of chemical carcinogens have been found in commercially available smokeless tobacco, including a variety of nitrosamines, which are known carcinogens and are considered to be important risk factors for cancer. Based on lifetime exposure levels, the levels of nitrosamines to which a snuff dipper is exposed are similar to doses, which cause cancer in laboratory animals. (•Connolly, 1986) Moist snuff has a nitrosamine level approximately 100 times higher than that allowed by the federal government in foods. (•Christen, 1992)

One cohort study of 17,000 U.S. men followed for 15 years found a two- to three-fold increase in the risk of oral cancer among smokeless tobacco users, compared to non-users. (• Connolly, 1986) A study based on interviews with cancer patients between 1969 and 1971 in 10 areas of the U.S. found that among men, moderate smokeless tobacco users had a four-fold increase in the risk of oral cancer, and heavy smokeless tobacco users had almost a seven-fold increase. (•Williams, 1977.) Long-term smokeless tobacco users are 50 times more likely to develop cancer of the buccal mucosa and gingiva than are non-users. (•Christen, 1992; •Winn, 1981) Snuff dippers specifically have four times the risk of developing oral cancer compared with those who do not use snuff. (•Winn, 1981)

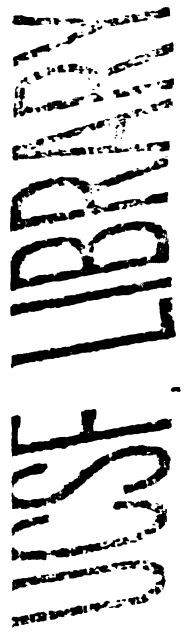
Smokeless tobacco use causes oral cancer at or near the site of placement. (•Connolly, 1986; •Hirsch, 1982) Additionally, there is a clear dose-response relationship between

oral cancer and smokeless tobacco use. The risk of oral cancer increases with the duration of exposure to smokeless tobacco. (•Campbell, 1999; •Connolly, 1986, •Hirsch, 1982) Greer and Poulson found oral lesions in smokeless tobacco users who had an average exposure time of approximately 3.5 hours per day, and whose habit was on average just 3 years old (median not provided). (• Greer, 1983)

Smokeless tobacco use is also linked in a dose-response relationship to oral leukoplakia, which may regress when tobacco use is stopped. (•Campbell, 1999; •Tomar, 1997; •Giunta, 1986) Oral leukoplakia is a white patch or plaque that cannot be characterized clinically or pathologically as any other disease. (•World Health Organization, 1978) It is the most common pathological finding of the oral mucosa in smokeless tobacco users, (•Greer, 1986; •Greer, 1983) and is often found on the floor of the mouth or under the tongue. It is a premalignant lesion: between 3% and 6% of people with oral leukoplakia are at risk for developing a transformation to either dysplasia or carcinoma. (•Christen, 1990)

In a national study of over 40,000 U.S. schoolchildren, 1.5% of all children ages 12-17 had oral lesions attributed by the dental examiners to smokeless tobacco use, while 3.7% of white males had such lesions. Prevalence of these smokeless tobacco lesions increased with age. The prevalence of such lesions in 12-17 year old children reporting *current tobacco use* was over 27%, with higher prevalence found among whites and males. The prevalence of oral mucosal lesions in children reporting *snuff* as the only currently used tobacco product was 38.5%, compared to 4.7% for children reporting no tobacco use.

(•Kleinman, 1994) Smokeless tobacco-associated lesions are strongly associated with duration and frequency of use, and the presence of oral smokeless tobacco lesions among adolescents may be an early indicator for increased risk of oral cancers. (•Tomar, 1997) Additional health problems associated with smokeless tobacco use include acute elevations of blood pressure and significant increases in heart rate. (•Connolly, 1986; •Schroeder, 1985; •Belanger, 1983; •Christen, 1982) Elevated blood pressure in smokeless tobacco users may be a result of either the nicotine content of the smokeless tobacco, the sodium content, or both. (•Hampson, 1985) Some athletes believe that smokeless tobacco improves their reactivity in sports. In actuality, however, performance is not enhanced; the athlete's feeling of preparedness may be due to the increased heart rate found when smokeless tobacco is used. (•Schroeder, 1988)



A hazard of smokeless tobacco use which is rarely mentioned is that of swallowing the saliva-smokeless tobacco mixture. Generally, the use of smokeless tobacco requires periodic expectoration. However, there has been a reported case of a user who admitted that he would "gut his chew" when at school in order to avoid spitting and making his use more obvious. Swallowing this mixture increases the risk of development of dysplasia and possibly carcinoma of the esophagus, stomach, and other tissues. (•Belanger, 1983) There have been several poisonings, some of them fatal, caused by the accidental ingestion of snuff. (• Goepferd, 1986; •Christen, 1982)

Many chewing tobacco products contain high levels of sucrose. In one study of several brands of chewing tobacco, average total water-soluble sugar contents ranged from over

26% in plug chewing tobacco to over 36% in loose leaf chewing tobacco. Sucrose is introduced during the manufacturing process, because it is not found in the unprocessed tobacco leaf. (• Hsu, 1980) It has been hypothesized that the stimulation of the growth of cariogenic organisms in smokeless tobacco is due entirely to the manufacturer's added sugar, and not to sugar found naturally in tobacco. (•Lindemeyer, 1981)

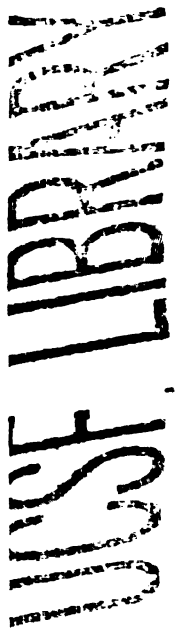
Reports in the literature regarding the link between smokeless tobacco and dental caries have been conflicting. In one report, it was suggested that heavy use of smokeless tobacco may decrease susceptibility to dental caries. This suggestion stemmed from three theories: (1) that smokeless tobacco caused an increased flow of saliva; (2) that the physical presence of a bolus of tobacco prevented plaque accumulation; and (3) that there were actual effects of the chemical components of tobacco on the oral microflora. That is, although sugars may be present in chewing tobacco, these sugars may not support the growth of cariogenic flora. While more study is needed to evaluate the effect of smokeless tobacco on salivary flow rate, and to evaluate how the physical presence of smokeless tobacco may prevent plaque accumulation, definitive evidence exists that the sugars in chewing tobacco do support the growth of cariogenic oral microflora. The chemical components of tobacco enhance the *in vitro* growth of two forms of streptococci implicated in the production of caries, specifically *S. mutans* and *S. sanguis*. (•Lindemeyer, 1981)

Because many of the initial negative effects of smokeless tobacco use are evident in the oral and perioral region, pediatric dentists who see adolescent patients on a regular basis

have the opportunity not only to educate patients about the harmful effects of smokeless tobacco use, but to point out specific visible lesions as well.

4. Nicotine

Nicotine suppresses stress, aggression, and hunger, while allowing the user to manipulate mood and performance. However, when nicotine is withdrawn, these actions are reversed. Stress and aggression increase, performance decreases, and hunger and weight gain result. (•Schneider, 1990)



Nicotine is psychoactive, producing dose-related changes in mood and feeling. Nicotine is also a euphoriant, categorized by both the National Institute on Drug Abuse and the U.S. Public Health Service as a dependence-producing drug, comparable in critical respects to cocaine, morphine, and ethanol. Its use can represent a form of drug dependence and can result in addictive behavior. (•Connolly, 1986; •US DHHS 1986) The American Psychiatric Association classifies nicotine addiction as an organic mental disorder. (•Henningfield, 1990)

Tobacco is as addictive for young people as it is for adults, and nicotine addiction may prevent adolescents from quitting. (•US DHHS, 1994) Recent behavioral studies confirm nicotine's ability to induce tolerance in adolescents, which is one characteristic of substances causing addiction. (•Woolf, 1997) In addition, early onset of tobacco use provides time for the nicotine addiction to grow. (•US DHHS, 1994)

Nicotine plays a major role in the harmful cardiovascular effects of smoking. It adversely alters the myocardial oxygen supply to demand ratio and produces endothelial injury, leading to the development of atherosclerotic plaques. (•Lakier, 1992) The concentration of nicotine found in the serum 10 minutes after smokeless tobacco is used is comparable to that found in the serum of cigarette smokers after a cigarette is smoked for approximately 10 minutes. The concentration of nicotine may have some type of controlling influence on the rate and amount of self-dosage, which would account for the similarity of concentrations between these two different modes of tobacco use. (•Russell, 1981; •Gritz, 1981)

Nicotine gum has a slower onset of action than does inhaled nicotine, resulting in reduced reinforcement effects of the drug. Therefore, rates of smoking cessation can be optimized by tailoring the dose of nicotine replacement to the individual degree of nicotine addiction. (•Pomerleau, 1992)

Because young people are as likely as adults to become addicted to nicotine, health care providers, including interested pediatric dentists, have the opportunity to help their nicotine addicted patients with tobacco cessation through the prescription of nicotine gum or nicotine transdermal patches.

5. Medical Costs of Tobacco Use

Pediatric addiction to nicotine, because of tobacco use, is a major public health problem which extracts a tremendous societal toll in terms of human suffering, loss of future

productivity, and the consumption of scarce health care resources. Teenagers smoke 1.1 billion packs of cigarettes yearly, and it is estimated that this tobacco use will account for more than $200 billion in future health care costs. (•Woolf, 1997) In 1995, the average retail price of a pack of 20 cigarettes ranged from $1.77 to $2.33, with an average cost of $1.89. (•CDC web site 4) In recent years smoking-related medical costs have risen considerably. For each of the 24 billion packs of cigarettes sold in the U.S. in 1993, about $2.00 was spent on avoidable medical care costs due to smoking. This means that approximately the same amount per pack is spent on medical costs due to smoking as is spent to purchase the cigarettes initially. Smoking is responsible for approximately 7% of the total health care costs in the United States. (•CDC, 1994)

In 1993, it was conservatively estimated that direct medical costs associated with smoking totaled $50 billion. This is a conservative estimate because it does not include medical costs attributable to burn care due to smoking-related fires, perinatal care for low birth weight infants of mothers who smoke, treatment of disease caused by secondhand smoke exposure, and the indirect costs of smoking resulting from lost productivity and early death. (•CDC, 1994) Smoking intervention programs are cost-effective compared to other types of healthcare interventions. (•Tsevat, 1992)

If fewer adolescents begin to use tobacco, the prevalence rates of tobacco use will decline, fewer people will suffer from the adverse health effects associated with tobacco use, and the overall costs associated with tobacco use will decline. Pediatric dentists have

the chance to contribute to a decrease in the overall health costs associated with tobacco use by influencing adolescents to remain tobacco free.

E. TOBACCO CONTROL LEGISLATION

No retailer in the U.S. may sell cigarettes or smokeless tobacco to anyone under the age of 18. Retailers are meant to verify by photo identification the age of individuals under the age of 27. Individual states are required to enact legislation restricting the sale and distribution of tobacco products to minors as a condition of receiving federal funds for substance abuse prevention and treatment. States are also required to enforce these laws. (•CDC web site, 1999)

Yet nationwide, 29.8% of students under the age of 18 who reported current cigarette use in 1997 had purchased their cigarettes in a store or gas station within the past 30 days, and 66.7% of these students had not been asked to show proof of age. (•Kann, 1998)

Since July 1999, a federal excise tax of 24¢ per pack of cigarettes has been charged. The federal excise tax on chewing tobacco has been 12¢/lb, and on snuff, 36¢/lb. Each individual state also charges excise taxes. Since 1999, for cigarette excise taxes, the highest taxes have been in Alaska and Hawaii, at $1.00 per pack, while Virginia's tax of 2.5¢ per pack has been the lowest. California has ranked 21st among the 50 states, with a tax of 37¢ per pack. The national average for state cigarette excise taxes has been 37.8¢ per pack. Federal and state taxes have been 30.5% of the average retail price of

cigarettes. (•CDC web site, 1999) An increase of 10% in the cost of a pack of cigarettes has been shown to result in a 4% decrease in cigarette consumption. (•Epps, 1995)

Health warnings are currently required on all advertisements for tobacco products, except on billboards for smokeless tobacco products. Tobacco advertising has not been allowed on television or radio since 1971. (•CDC web site, 1999) Because of these bans on broadcast media, the tobacco industry has shifted from advertising to promotion. This has undermined the effectiveness of the advertising ban because the use of promotional materials, the sponsoring of sports events, the distribution of tobacco-related specialty items, the use of tobacco displays at points of sale, and the use of logos in nontraditional venues may actually be more effective in reaching target audiences than traditional advertising. (•US DHHS, 1994)

Studies have shown that cigarette advertising influences the health behavior of young people. (•US DHHS, 1994) Teenagers disproportionately buy the most heavily promoted cigarette brands: 86% of adolescents buy the three most heavily advertised brands, in contrast to adults, who are more likely to buy "generic" brands which are less expensive and not as well advertised. One of the smallest tobacco companies, the Liggett Group, recently admitted that the tobacco industry markets its products to underage youths. (•Paralusz, 1998) In the first four years that Camel advertisements featured Joe Camel, smokers under the age of 18 who preferred Camels rose from less than 1% to as much as 30% of the market. Studies have shown Joe Camel to be as familiar to 6-year-olds as Mickey Mouse. (•US DHHS, 1994)

The two main effects of pervasive tobacco promotion are, one, that it creates the perception that more people smoke than actually do, and two, that it makes smoking look "cool" by capitalizing on the disparity between actual self-image and ideal self-image, and implying that smoking may close the gap. Cigarette advertising and promotion therefore increase young people's risk of smoking by affecting their perceptions of smoking. (•US DHHS, 1994)

There are no studies to date that report on the relationship between the level of cigarette taxation in a state and the tobacco control prevention or cessation activities among pediatric dentists in that state. Aspects of this study will address this relationship.

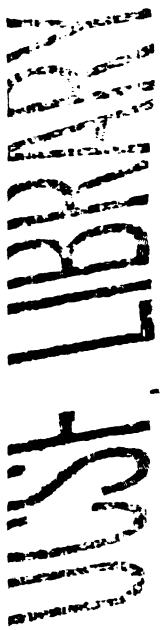
F. TOBACCO CONTROL AND HEALTH CARE PROFESSIONALS

Dentists have long been encouraged to participate in tobacco control activities. The American Dental Association (ADA) has recommended since 1964 that "ADA members be encouraged to inform their patients of the health hazards of the use of tobacco and, especially with young people, warn against acquiring the habit of cigarette smoking." (•American Dental Association, 1964) Since then, the ADA has stated its firm opposition to tobacco use in six additional resolutions. (•McCann, 1989)

Similar recommendations have been made in the National Cancer Institute's (NCI) Cancer Control Objectives, the U.S. Preventive Service Guidelines, (•Brink, 1994) and the U.S. Department of Health and Human Services' Healthy People 2000 objectives.

Objective 3.16 of the year 2000 health objectives is to "increase to at least 75% the proportion of primary care and oral health care providers who routinely advise cessation and provide assistance and follow-up for all of their tobacco-using patients". (• Healthy people 2000, 1990)

Dentists have also encouraged their colleagues to become involved in tobacco cessation. Campbell et al., 1999, state that, "The dental office is an ideal setting for tobacco cessation services, as preventive treatment services, oral screening, and patient education always have been a large part of dental practice." (•Campbell, 1999 p.220) This sentiment is echoed by Schroeder, 1990, who states that, "there is a need for dentists to take an active part in educating patients and the public about complications with use of ...tobacco products. They should also be prepared to involve patients in cessation programs." (•Schroeder, 1990, p.88) Fried and Cohen, 1992, note that, "Due to the regularity with which dentists typically see their patients, coupled with the large numbers of patients who seek routine dental care, dentists are in prime positions to reach a large segment of the population and to provide continuity in their tobacco-use interventions." (•Fried, 1992, p.10)



Numerous studies have shown that counseling delivered by health care professionals is effective in helping patients quit tobacco use. Frequent contact over an extended period of time provides the opportunity for reinforcement and long-term contact, both of which are essential for improving the success of patients who attempt to quit. (•Dolan, 1997)

After receiving professional advice and the appropriate assistance from their health care providers, patient cessation rates of between 2% and 40% have been reported. (•MMWR 46(51), 1997, 30%; •Skjöldebrand, 1997, 4.2%; •Stevens, 1995, 12.8%; •Gilbert, 1992, 12.5%; •Cooper, 1990, 38.5%; •Solberg, 1990, 33%; •Cohen, Encouraging, 1989, 15.0%; •Cohen, Helping, 1989, 16.9%; •Cooper, 1989, 40%; •Cummings, 1989, 2.6%; •Wilson, 1988, 4.4%; •Folsom 1987, 2.0%; •Janz, 1987, approximately 25%; •Li, 1987, 6.6%; •Secker-Walker, 1987, 6.5%; •Christen, 1986, 23%; •Russell, 1979, 4.8%) Quit rates after one year are typically between 5% and 15%, and are about 5 percentage points higher than the quit rates of untreated control subjects. (•Stevens, 1995) However, some studies have demonstrated dramatically higher quit rates.

A 40% cessation rate was demonstrated after one year and verified by carbon monoxide assays. The subjects in this study were heavy smokers and had been smoking on average for more than 30 years. The intervention was nicotine gum (nicotine polacrilex, or Nicorette) and counseling. (•Cooper, 1989)

A 33% cessation rate was found when physicians provided tobacco cessation counseling (3 minutes initially), self-help materials, and follow-up counseling (longer appointments) to those patients most interested in quitting. The 33% cessation rate represented a five-fold increase in quit rates over those of untreated patients for the Minneapolis, Minnesota clinic in which this smoking cessation program was established. (•Solberg, 1990)

A cessation rate of 23% was demonstrated after patients received counseling and appropriate assistance from dental professionals. This study was conducted at the Indiana University School of Dentistry with 48 patients who desired to quit. These patients received nicotine gum and thorough counseling, and cessation was verified after 12 months with collection of salivary samples to determine cotinine levels. (•Christen, 1986)

When quit rates among dental patients receiving smokeless tobacco use cessation intervention were compared with quit rates among dental patients receiving usual care from the same providers, a difference of 12.8% was biochemically verified after 12 months. This intervention required between 2 and 4 minutes of the hygienist's time, and about 30 seconds of the dentist's time. (•Stevens, 1995)

In one of the first studies on the effect of providing tobacco use prevention and cessation information to children and adolescents in a dental setting, a significant reduction in the percentage of young people using tobacco was seen after the study intervention. The intervention consisted of approximately 5 minutes of individualized information during the dental examination from the dentist, hygienist, or assistant, and educational materials in the waiting room (posters, brochures, and video program). When the intervention was begun, 11.5% of children visiting the dental clinic reported daily tobacco use. After one year of the intervention, 7.3% of children reported daily tobacco use. The statistically significant effect of this minimal intervention was 4.2%. There was no control group. (•Skjöldebrand, 1997)

Not only are health professionals capable of helping their patients stop tobacco use, but also, patients prefer to receive counseling on smoking cessation from health professionals. (•Lesmes, corporate, 1992; •Owen, 1990) A survey of over 3,000 adult dental patients found that of the 70% of tobacco users who were interested in quitting, almost 60% felt comfortable receiving tobacco use cessation services in their dentists' offices. There was no difference in support for tobacco cessation services in the dental office between tobacco users and non-users. (•Campbell, 1999)

Another study which looked at patient attitudes toward receiving cessation advice asked patients in a medical practice if they believed that their physician should advise them to stop smoking. Almost 90% of patients believed that their physician should do so. About half of patients also believed that their physician should help them to quit. (•Kviz, 1997)

Moreover, both adolescent and adult smokers are interested in quitting. Two reports indicate that approximately 70% of adults who smoke want to quit. (•Campbell, 1999; •CDC, 45(27), 1996) A 1993 poll reported that 76% of adult smokers have tried to quit, and 30% were trying to quit at the time of the survey. (•SmithKline Beecham, 1993) Two large-scale national surveys of adolescents found that youths want and try to quit. The 1989 TAPS (Teenage Attitudes and Practices Survey) data reveal that 74% of 12- to 18-year-old smokers had thought seriously about quitting, 64% had tried at some time to stop smoking, and 49% had tried during the preceding 6 months to stop. (•Lynch, p.74, 1994) Data from the Monitoring the Future Project, reported in the 1994 Report of the U.S. Surgeon General, show that nearly half of those smokers who were high school

seniors between 1976 and 1989 wanted to quit, and about 40% had tried unsuccessfully to do so. (•US DHHS, 1994)

Many patients at risk for tobacco use or already using tobacco see their dentists regularly. Most adolescents see their dentist on a regular basis: (•Campbell, 1999) more than 83% of 15- to 19-year-olds see their dentist at least once a year. (•CDC, 42(33), 1993) Surveys of smokers in the U.S. and Canada found that between 52% and 58% of smokers made regular appointments with their dentists. (•Tomar, 1996; •Locker, 1992) These regular interactions between tobacco users and dentists provide dental teams with the opportunity to provide tobacco use cessation services for their patients.

Therefore, this is a situation ripe with opportunity: patients who smoke, the majority of whom are interested in quitting, visit their dentists frequently. They feel comfortable receiving tobacco cessation services from their dentists, and these services have been proven to be effective. Yet despite recommendations that dental professionals become more involved in tobacco use prevention and cessation, despite evidence of the effectiveness of tobacco cessation delivered by dental professionals, despite evidence of patient desire to have a health care provider deliver tobacco cessation services, despite evidence of patient desire to quit tobacco use, and despite evidence that tobacco users visit the dentist, a report from the 1992 National Dental Tobacco-Free Steering Committee states that only one quarter of dentists offer patients tobacco cessation services. (•Barker, 1995)

Very few dental professionals regularly provide patients with complete tobacco use prevention or cessation services. Although dental professionals may ask patients about tobacco use, few go on to assist patients in tobacco use cessation, or to document use status in patients' charts. (•Dolan, 1997; •Chestnutt, 1995; •ADA, 1994; •Hastreiter, 1994; •Secker-Walker, 1994; •Brink, 1994; •Jones, 1993; •Logan, 1992; •Fried, 1989; •Gerbert, 1989) However, when dentists are aware of patient tobacco use, they are likely to advise those patients to quit. (•Dolan, 1997)

Similarly, pediatricians frequently ask parents about their children's passive smoke exposure and advise reducing it, but seldom assist parents with specific advice regarding effective methods to quit smoking. (•Burnett, 1999)

Asking About Tobacco Use

Studies have found that between 29% and 71% of dentists ask their patients about tobacco use. (•ADA, 1994; •Jones, 1993; •Hastreiter, 1994; •Logan, 1992) The numbers on the higher end are similar to those reported for physicians. (One study found that physicians knew the smoking status of their patients in 66% of outpatient visits.) (•Jaaen, 1997)

A survey of dentists in the U.S. found that 71% of periodontists ask most patients about smoking. (•Dolan, 1997) A 1993 survey of Minnesota dentists found that 55% routinely ask their patients about cigarette use, and 48% routinely ask about smokeless tobacco use. (•Hastreiter, 1994) The National Cancer Institute surveyed dentists in 11 U.S.

communities and estimated that 51% of dentists ask new patients about smoking, and 29% ask recall patients. (•Jones, 1993) A survey of dentists in Iowa in 1989 found that 44% asked new patients about tobacco use. (•Logan, 1992) The 1994 ADA national survey found that 40% of dentists routinely ask their patients about tobacco use. (•ADA, 1994) These surveys show that dental professionals are becoming more active in terms of asking their patients about tobacco use.

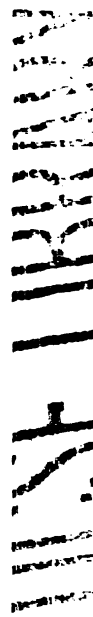
The dentists in these surveys, however, were not specialists in pediatric dentistry, and the patient populations that the responding dentists served were not primarily pediatric or adolescent patients. When pediatric dentists were specifically surveyed as part of a larger study, tobacco control activities, including asking about tobacco use, were not found to be a routine part of pediatric dental practice. Of 586 pediatric dentists surveyed, only 2% asked most or nearly all patients if they used tobacco. (•Dolan, 1997)

Advising Tobacco Users to Quit

Dental professionals are becoming more involved in advising known users to quit, although the percent of dental professionals who provide this advice varies greatly among various studies. A survey of dental patients in Finland found that just 4% of dentists reported that they always advised and 15% often advised their patients to quit smoking. (•Telivuo, 1991) A later survey by the same author of 1200 Finnish dental patients found that 8% of daily smokers reported that they had been advised by their dentists to quit. (•Telivuo, 1995) Another study found that for smokers who visited a dentist during a one year time period between 1991 and 1992, 24.1% reported that they had been advised by

their dentist to quit smoking. (•Tomar, 1996) A 1983 study of dentists in Vermont found that approximately 25% of smokers were advised to change their smoking behavior in some way (e.g. either to quit or to cut down). (•Secker-Walker, 1987)

Yet, other studies have reported much higher rates of cessation advice. One study found that the most common tobacco use cessation service provided by dentists was advising known users to stop smoking. Between some and most patients who smoked received this service. (•Secker-Walker, 1994) A 1997 survey found that 66% of all dentists, and 60% of all hygienists, reported that they advised most or nearly all of their patients who reported smoking to stop, while 75% of all dentists, and 84% of all hygienists, advised most or nearly all of their patients who reported using smokeless tobacco to stop. This survey reported that of the 586 pediatric dentists included, 80% advised most or nearly all known tobacco users to quit. (•Dolan, 1997) In an Oregon study, dentists were more likely to advise patients about the health hazards of using smokeless tobacco (88%) than smoking (55%). (•Severson, Dental Office, 1990) Similarly, a survey of Minnesota dentists found that 73% of dentists advised smokeless tobacco users to quit, while 58% advised smokers to quit. (•Hastreiter, 1994)



Assisting Tobacco Users with Quitting

However, dental professionals do not routinely provide other tobacco use cessation services. Less than one-third of dentists or dental hygienists provide patients with any cessation services other than advising known users to quit. (•Dolan, 1997; •Hastreiter, 1994; •Jones, 1993; •Logan, 1992) A survey asking dentists and dental hygienists to

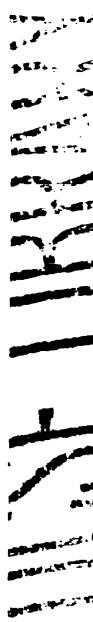
estimate if they provide specific services to all, most, some, or no patients found that almost no patients received any of the following services: 1) help in setting a quit date, 2) self-help materials, 3) recommendation of nicotine gum, 4) a cessation follow-up visit, 5) documentation in the medical record, or 6) referral to a stop-smoking group, 7) a quitters support group, or 8) a one-on-one support network. (•Secker-Walker, 1994) A comparable survey found that fewer than 9% of dentists provided similar cessation services. (•Jones, 1993)

In another study, the authors performed an oral examination on study participants, who were smokeless tobacco users. For 62% of participants, that oral examination revealed clinically visible lesions with color changes and wrinkling of the tissue surface. Despite the fact that 73% of these users had visited the dentist in the past year, only 10% reported that their dentist had informed them that they had a white or red patch in their mouth. (• Schroeder, 1988) This indicates that either dentists are not screening for oral changes during the routine intraoral exam, or that they are not discussing the results of these screenings with their patients in clear, understandable language. Yet 93% of dentists, hygienists, and assistants say they inform patients who use tobacco about any tobacco-related hard or soft tissue changes or lesions. (•Hastreiter, 1994)

Comparison of Dentists and Physicians

Dentists advise their patients to quit smoking about half as often as physicians (24.1% vs. 51.6%). (•Tomar, 1996) In addition, dentists are significantly less active in providing cessation assistance than physicians. When smoking cessation activities provided by

dentists and physicians are compared, dentists are less likely than physicians to: 1) have a routine system for providing smoking cessation activities for patients, 2) explain the dangers of smoking, 3) advise patients to stop smoking, 4) get patients to set a quit date, 5) provide self-help materials, 6) refer to either a stop smoking group, 7) a support group, or 8) a one-on-one network, 9) recommend nicotine gum, 10) arrange a follow-up visit, or 11) document results in the medical record. Unfortunately, the conclusion of this study was that it would be more valuable to use available resources to train physicians and other counselors rather than dentists, because training dentists would require substantially more time than training the other groups. (•Secker-Walker, 1994)



In a comparison between medical internists and general dentists in San Francisco, California, the internists were much more likely to advise patients who smoke to quit at nearly every, or every, visit (58% vs. 17%). The physicians were also more likely to spend time counseling patients about tobacco cessation, give smokers educational materials, refer smokers to cessation programs, and document smoking status in the patient chart. (•Gerbert, 1989)

Dentists in a Pennsylvania study were less likely than physicians to advise patients who use tobacco to quit, counsel patients, help patients set a quit date, and provide educational materials. Even when dentists asked patients about smoking (64% of new patients were asked, and 52% of recall patients were asked), fewer dentists than physicians followed this up by explaining the dangers of smoking to those patients who smoked. Activities to help patients quit tobacco use were even less frequently performed: no dentists reported

helping patients to set a quit date or develop a cessation plan, nor did they prescribe nicotine gum. Only 3% of dentists provided self-help materials and only 1.8% of dentists made referrals to smoking cessation programs. (•Brink, 1994)

However, some dentists are involved in tobacco use cessation, and their success indicates the potential that exists for dental professionals to become successfully involved in tobacco cessation services. A 1986 study of Vermont dentists found that 87% discussed smoking concerns with their patients, and 60% provided advice on smoking cessation. (•Secker-Walker, 1989)

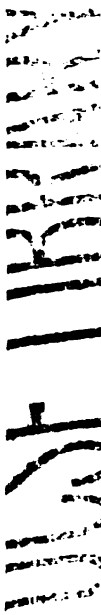
Two recent studies successfully involved dental professionals in tobacco use prevention and cessation for their patients. The first study, directed by the Oregon Research Institute, looked at tobacco cessation with the intervention delivered by dental hygienists. Their intervention was effective in getting smokeless tobacco users to quit and to sustain abstinence at both three and twelve months (although it was not effective for cigarette smokers). (•Severson, 1998) In the second study, orthodontists in Southern California delivered tobacco use prevention information to adolescents. They found a very small but not statistically significant reduction in the number of patients who started smoking. These studies demonstrate the potential benefits to patients of dental professionals' involvement in tobacco prevention and cessation. Even a small reduction in tobacco use initiation rates during adolescence could have substantial public health benefits, including the prevention of many premature deaths. (•Hovell, 1996)

A study involving five physicians' practices in London demonstrates both the ability of physicians to aid patients in tobacco use cessation, and the potential for dentists to become similarly involved. The effects of physicians' smoking-cessation advice were evaluated with 2,183 cigarette-smoking patients. The most intensive of three intervention groups received a questionnaire, advice to stop smoking, a leaflet to help them stop, and a warning from their physician that they would be followed-up. Patients in this intensive intervention group stopped smoking at a rate of 5.1% after one year, compared with just 0.3% of the control group. This indicates a long-term success rate for the smokers in the most intensive intervention group of 4.8% (the difference between 5.1% and 0.3%). The results show that physicians' advice to stop smoking is effective, and that it is enhanced by printed materials and warning about follow-up. (•Russell, 1979) The effectiveness of printed materials is supported by another study which documented an increased number of patients who quit smoking after receiving a self-help manual. (•Janz, 1987) The authors of the London physicians study conclude that giving patients advice to stop smoking increases the proportion of patients who try to stop, rather than the success rate of those who try. Therefore, the more that health care professionals encourage smokers to quit, the greater number of smokers will be reached, and will attempt to quit. (•Russell, 1979)

Because adolescents are at risk for tobacco use, and pediatric dentists interact with adolescents on an ongoing basis, pediatric dentists have the opportunity to influence the tobacco use attitudes and behaviors of adolescents. Our study is designed to assess the degree to which pediatric dentists wield this influence.

1. Barriers

An oft-cited barrier to the provision of tobacco cessation services is lack of time. (•Burnett, 1999; •Chestnutt, 1995; •Severson, Dental Office, 1990; •Ockene, 1987; •Cummings, 1987; •Orleans, 1985; •Rosen, 1984) In fact, lack of time was the main barrier to incorporating tobacco cessation into dental practices in a 1993 survey of Minnesota dentists, with 41% of dentists citing this barrier. (•Hastreiter, 1994)



The interventions recommended by the National Cancer Institute (NCI), however, take only 1 to 2 minutes to perform, (•Mecklenburg, 1993) and even the initial interaction with potential quitters should take no longer than three minutes. (•Cohen, 1990) Studies have shown that health professionals who provide tobacco cessation services spend approximately 2 to 5 minutes talking with patients about tobacco cessation. Specifically, dentists and dental hygienists spend on average 2½ to 3 minutes, while physicians spend an average of 5 minutes. (•Secker-Walker, 1994 and 1989) A lot can be accomplished in a few minutes: assessing a tobacco user's readiness to quit, setting a quit date, outlining key steps in quitting, and providing resources to help a tobacco user through the quitting process. (•Secker-Walker, 1994; •Mecklenburg, 1993; •Gilbert, 1992; •Li, 1984)

In addition to lack of time, barriers to the provision of tobacco use cessation services that have been identified by dentists include pessimism about the patient's ability to quit, and lack of confidence in counseling skills. (•Campbell 1999; •Burnett, 1999; •Chestnutt, 1995; •Hastreiter, 1994; •Severson, Dental Office, 1990; •Cummings, 1987) Addressing

lack of confidence in counseling skills, one recent study found that patients' beliefs about whether or not their dental office should offer tobacco use cessation services did not differ according to the confidence level of their dental professional. This means that regardless of the dental professionals' confidence in providing tobacco use cessation services, most patients are receptive to such services, and see them as legitimate dental services. (•Campbell, 1999)

Pediatricians, too, are influenced by the amount of confidence they have in their counseling skills. Those pediatricians who believe that the tobacco cessation counseling which they provide can be effective, and those who believe themselves to be effective providers of such counseling, are more likely to provide tobacco cessation services to patients. (•Zapka, 1999)

In numerous surveys, practicing dentists and hygienists cite lack of preparation as a major impediment to helping patients quit using tobacco, and to preventing initiation of tobacco use. On the other hand, with formal education, providers are more likely to intervene in their patients' tobacco use. (•Dolan, 1997; • Fried, Oral Health, 1992; •Severson, Dental Office, 1990) Similarly, pediatricians who have received training in counseling about tobacco issues report significantly higher levels of counseling for both adolescent smokers and parents who smoke. (•Zapka, 1999)

Along the same lines, lack of adequate referral resources and lack of patient education materials have been cited as strong barriers to incorporating tobacco cessation into dental

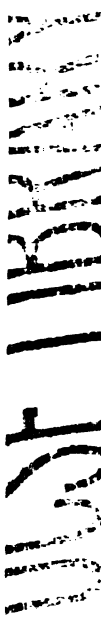
practices. With formal education, health care providers are more likely to be able to obtain adequate resources for their patients. (•Hastreiter, 1994)

Additional barriers include the perception that tobacco use is considerably less important than other issues related to dental problems, and the inability to charge for time spent in counseling. (•Dolan, 1997; •Fried, 1992; •Hastreiter, 1994; •Gerbert, 1989; •Cummings, 1987; •Rosen, 1984) Reasons that pediatricians cited for not initiating a tobacco cessation program included a belief that it was "not their responsibility". (•Burnett, 1999) Other barriers to the provision of tobacco cessation services cited by dentists include previous failure to persuade patients to quit, (•Cummings, 1987) feeling that patients may not be receptive to tobacco use cessation services, fear of patient alienation, and fear that patients will leave the practice if the advice is perceived as "meddling" or "harassment". (•Campbell 1999; •Chestnutt, 1995; •Hastreiter, 1994; •Gerbert, 1989; •Cummings, 1987) In fact, fear of patient alienation is one of the major barriers to the provision of tobacco use cessation services cited by dental offices. (•Chestnutt, 1995; •Locker, 1992; •Gerbert, 1989)

Perceptions about how patients will respond to tobacco use cessation services affect dental professionals' motivation to offer such services. (•Bader, 1997) Dental professionals who perceive that patients are not receptive to tobacco use cessation services are less likely to offer such services to patients. (•Bader, 1997; •Campbell, 1999)

Patients, however, as previously described, are receptive of tobacco cessation services from dental professionals.

A recent study compared dental patients' beliefs about tobacco use cessation services in their dentists' offices, to their dental professionals' beliefs. Although almost 60% of the 3,088 patients surveyed believed that dental offices should provide tobacco use cessation services to their patients routinely, none of the 52 responding dental professionals believed that cessation services should be routinely offered. In fact, 62% of the responding dental professionals thought that patients did *not* expect such services. (•Campbell, 1999)



Patient age may affect the likelihood of support for tobacco cessation services. Smokers less than 50 years of age are more likely than those age 50 and older to approve of physician assistance in tobacco use cessation. (•Kviz, 1997) Similarly, patients ages 15 to 24 are more likely than patients age 25 and older to believe that dental offices should provide tobacco use cessation services. Adolescents may be more receptive to dental advice because oral health and cosmetic effects are important during adolescence. Frequent professional advice may be especially effective for adolescents because they are more likely to quit than are older, more addicted tobacco users. (•Campbell, 1999) However, there needs to be further investigation into the dental professional's role in adolescent tobacco use cessation. (•Campbell, 1999)

When tobacco use cessation services are provided, patients and health care providers may differ in recalling what happened. In a clinical trial conducted in physicians' offices where the intervention group received smoking cessation advice from their physicians, only 60% of patients recalled receiving a smoking message, and only 85% of those patients perceived it as a message to quit. (•Folsom, 1987) Another study found that 65% of dentists and 95% of physicians reported that they advised "most or all" of their patients who smoked to quit, but only 7% of smokers who had seen a dentist in the year preceding the study, and 29% who had seen a physician, reported that they had been advised to quit. (•Brink, 1994) This may represent over-reporting or faulty recall by health care providers, an unclear message from health care providers to patients, smokers' denial that they had been advised to quit, faulty recall by smokers, or a combination. Whatever the cause, better methods of communication between dental professionals and their patients are needed.

There is clearly a need for increased action on the part of dental professionals in the area of tobacco use cessation for patients. In order to meet this need, improved communication between dental professionals and patients is necessary. Improved communication will facilitate not only the provision of tobacco use cessation services, but may also improve other aspects of the practice as well: mutual communication is an important component in patients' views of the ideal dental practice. (•Lahti, 1996) In fact, communication has been found to be one of the top ten aspects that patients include when reflecting on the quality of dental care. (•Goedhart, 1996)

To date, no surveys have been conducted in the United States on tobacco control behaviors solely among pediatric dentists in their dental practices. This survey will address the question of what pediatric dentists throughout the United States are doing in the area of tobacco control prevention and cessation for their adolescent patients, and what barriers pediatric dentists feel hinder or prevent them from participation in tobacco control activities.

2. Training in Tobacco Use Prevention and Cessation

The amount of counseling provided by health professionals to patients who use tobacco closely corresponds both to the amount of training those health professionals have had, and to how well prepared those health professionals feel to provide such counseling. With formal training, health care providers are more likely to provide tobacco use intervention services. (•Secker-Walker, 1994; •Fried, 1992) Health professionals who feel less prepared to provide counseling actually do provide fewer services. (• Secker-Walker, 1994)

Surveys of dentists' and dental hygienists' attitudes toward the provision of tobacco use cessation counseling have consistently found that respondents feel unprepared to provide such services. (•Dolan, 1997; •Hastreiter, 1994; •Jones, 1993; •Logan, 1992; •Gerbert, 1989; •Fried, 1989) Dentists attribute this feeling of being unprepared, at least partly, to a lack of formal training in tobacco use cessation counseling. (•Gerbert, 1989)

Pediatric dentists, in particular, feel unprepared to provide tobacco use cessation counseling: while 20% of all dentists feel well-prepared to help patients stop tobacco use, just 12% of pediatric dentists feel well-prepared to do so. Interestingly, 12% of the pediatric dentists in this sample had completed formal training in tobacco use cessation. (•Dolan, 1997)

After participating in an educational program, pediatric health professionals will change both their behaviors and their attitudes about their role in counseling patients about tobacco use. (•Kosower, 1995) Therefore, tobacco use cessation training for health professionals who feel less prepared could increase their confidence in providing cessation advice, and also the likelihood that such advice would be effective. (• Secker-Walker, 1994) Medical residents who participated in a 3 hour tobacco cessation training program showed a significant increase in knowledge after completing the program, and perceived themselves as having significantly more influence on their patients who smoke. In addition, their counseling skills improved significantly. (•Ockene, 1988) In a different study, pediatric medical residents trained in tobacco use cessation were more likely than residents who did not receive training to raise tobacco-related issues and to counsel adolescents about cessation. (•Klein, 1995) In a third study, pediatric medical residents who received an educational program comprised of three presentations, written materials, and a bulletin board showed significant improvement in counseling, and increased confidence in counseling. Residents' perceptions of barriers to counseling, including expertise, time limitation, and doubts regarding counseling effectiveness were diminished. (•Kosower, 1995)

Dentists have reported increased confidence and effectiveness in tobacco use cessation interventions after receiving training in counseling techniques. (•Cohen: Helping, 1989) One recent program in California provided dentists with a one-time, 90 minute training session in tobacco cessation. Three months after the training, participants estimated that an average of 2 patients per dental office had stopped smoking, and that an average of 13 patients in the office were engaged in tobacco cessation programs. This compares to an average of 7 patients per office who were engaged in tobacco cessation programs prior to the training. (•Wood, 1997)

Few dentists (7-14%) or hygienists (9-23%) have formal training in tobacco use cessation, (•Dolan, 1997; •Hastreiter, 1994; •Jones, 1993) and fewer still (5%) have recent training, within the past year. (•Logan, 1992) However, they are willing to learn: between 45% and 68% of dentists are willing to receive tobacco use cessation training. (•Dolan, 1997; •Hastreiter, 1994; •Fried, 1992; •Secker-Walker, 1989; •Secker-Walker, 1987)

Ideally, training for dentists in providing tobacco use prevention and cessation would begin during dental school, although training is also effective for physicians and dentists who are already in private practice. (•Cohen: Encouraging, 1989; •Cohen: Helping, 1989; •Wilson, 1988) There are very few continuing education (CE) courses offered which teach tobacco use intervention skills. (•Geboy, 1989) One available course, entitled "Quit for Life", provided medical internists with 3 hours of training about how to help

smokers quit. Although the patients of these physicians had a one year, chemically-verified quit rate that was not statistically different than the quit rates for the patients of non-trained internists (just 1% higher), the physicians who participated in the CE course were more involved in tobacco cessation and had more positive feelings about their counseling effectiveness. Specifically, participant physicians discussed smoking with more patients who smoked, spent more time counseling them about smoking, helped more patients set quit dates, gave out more self-help booklets, and made more follow-up appointments to discuss smoking than did internists who did not participate. (•Cummings, 1989)

A program in place at the University of Missouri-Kansas City School of Dentistry has been successful in both teaching dental students to become involved in tobacco use cessation, and providing tobacco use cessation services to dental school patients in the student clinic. Eighty-six percent of participating dental students said they would like to continue to provide tobacco cessation services once in private practice, and 98% said they intended to advise their patients against tobacco use. (•Barker, 1995)

A 1990 survey of U.S. dental schools found that 50% of schools had some lecture time devoted to instruction on smoking hazards, usually for one to two hours as part of an oral pathology course. Students in three quarters of the schools took a smoking history from their patients, and 85% were encouraged by faculty to advise their patients to quit smoking. (•Cheney, 1990)

The American Association of Dental Schools (AADS) supports including tobacco use prevention and cessation curriculum in educational programs. (•Fried, Oral health, 1992) Despite this support, only 28% of dental and dental hygiene schools teach students specifically about tobacco intervention counseling techniques. Both dental and dental hygiene programs tend to focus on the dangers of tobacco use, with less emphasis placed on counseling techniques. (•Fried, Tobacco use, 1990) One national study focusing specifically on smokeless tobacco found dental hygiene students to be poorly informed about smokeless tobacco, and concluded that these students were ill-equipped to present accurate instructions on the health hazards of smokeless tobacco. (•Chng, 1995) A more recent survey of dental hygienists, however, found that although just 45% felt that their knowledge about oral cancer was up to date, the majority (between 50 and 60% in most cases) correctly answered questions about oral cancer. (•Forrest, 1998)

Because this study will determine a need and willingness for pediatric dentists to be trained in tobacco use prevention and cessation strategies, it may have important implications for continuing education courses targeting pediatric dentists, and possibly for the content of postgraduate training programs for pediatric dentists.

II. MATERIALS AND METHODS

A. HUMAN RESEARCH COMMITTEE APPROVAL

This study was approved by the Committee on Human Research (CHR) at the University of California, San Francisco (UCSF) on June 19, 1998. (Approval number H1242-15268-01.)

B. DISCUSSION GROUP

To develop and modify the survey, a discussion group with seven pediatric dentists was conducted in July, 1998. The pediatric dentists chosen to participate in this discussion group were a convenience sample of pediatric dentists practicing in Northern California who attended the July meeting of the Bay Area Pedo Study Club in San Francisco, CA.

Participants from the study club were asked to participate in the discussion group by the pediatric dentist leading the meeting, after the co-principal investigator, Dr. Ryan, explained the purpose and goals of the study. A consent form was signed by each participant prior to participation in the discussion. This consent form explained the purpose, methods, risks, and potential benefits of the study. The addresses and phone numbers of the co-principal investigator and the Committee on Human Research at UCSF were provided.

These pediatric dentists were asked about their practices and attitudes related to the provision of tobacco use prevention and cessation to adolescent patients, their perception

of barriers to the implementation of tobacco use prevention and cessation activities in their offices, and the kinds of tobacco services they would be willing to provide to adolescent patients. Responses were recorded by the co-principal investigator, and the responses and discussion were qualitatively analyzed.

C. PILOT TESTING OF SURVEY

Based on information obtained in the discussion group, the specific emphasis of the survey was developed. The survey questions were designed to assess the variables hypothesized to be related to the provision of tobacco use prevention and cessation services: demographics, practices, attitudes, and level of knowledge.

The survey was then pilot tested with eight pediatric dentists for clarity, length, and reliability in September, 1998. These pediatric dentists, who had not participated in the discussion group, were chosen to participate in the pilot testing and formed a convenience sample of pediatric dentists practicing in Northern California. They were contacted at San Francisco and Sacramento area pediatric dental study club meetings, and through the Postgraduate Pediatric Residency Program at UCSF.

The cover letter which was provided or mailed with each survey explained the purpose, methods, risks, and potential benefits of the study. The addresses and phone numbers of the co-principal investigator and the Committee on Human Research at UCSF were provided. Respondents were advised that return of the survey was construed as consent.

Names were not used on surveys; instead, a unique identification number was assigned to each survey.

D. SURVEY ADMINISTRATION

1. Initial Mailing

Changes were made to the survey based on the pilot test responses. The survey was then mailed in November, 1998 with a cover letter (see Appendix A) and return-addressed stamped envelope to a national, random sample of 1,500 of the 4,200 members of the American Academy of Pediatric Dentistry (AAPD). The random sample was generated by the AAPD. As previously stated, the cover letter explained the purpose, methods, risks, and potential benefits of the study, and provided information about both the confidentiality of responses, and the addresses and phone numbers of the co-principal investigator and the Committee on Human Research at UCSF.

AAPD members were chosen to receive this survey because the AAPD, with approximately 4,200 members, is the professional organization whose dentist members are specially trained to provide oral health care for infants, children, adolescents, and patients with special health care needs. Pediatric dentists receive a minimum of two years of training beyond dental school. All AAPD members were eligible to receive the survey, except those who were retired, student, or foreign members.

Dr. John Bogert, Executive Director of the AAPD at the time that this survey was designed and mailed, gave permission for the survey to be conducted, had a random

sample of 1,500 members of the AAPD generated, and donated the 1,500 mailing labels that were used. The surveys were coded and kept in the office of the co-principal investigator, Dr. Walsh.

2. Second Mailing

A second survey, modified cover letter, and return-addressed stamped envelope were mailed in February, 1999 to those who had not returned the initial survey.

3. Telephone Follow-Up of Non-Responders

We generated a random sample of 130 pediatric dentists of the 551 who had not responded to either the first or second survey mailing. This represented 8.7% of the survey sample of 1,500. Dr. Ryan attempted to reach each of these pediatric dentists by telephone in April, 1999. Information gathered from the telephone call was recorded on a Telephone Questionnaire. The purpose of the telephone call was to discover why the pediatric dentist had been unable to return the survey, and to gather some basic demographic information. Those pediatric dentists who expressed a willingness to complete a survey during the telephone call were then mailed a survey. Consent for the telephone call was construed from the doctor's willingness to participate in the conversation.

E. STATISTICAL METHODS

Epi Info Version 6 (Centers for Disease Control and Prevention, Atlanta, GA) was used to create data entry screens. Error checking and logical inconsistency checking were built

into the program. Information gathered from the survey was summarized, including frequency distributions of practices, attitudes, and knowledge. The data were analyzed using the statistical software program SAS© (version 6.12, SAS Institute, Cary, NC). Data were tested using the Chi-Squared statistic, with $p \leq 0.05$ indicating significance. Spearman rank correlations were performed, again using $p<0.05$ as the significance level. Stepwise logistic regression models, including odds ratios and 95% confidence intervals, with entry and stay criteria of $p<0.05$, were carried out to identify predictors of tobacco control activities. The stepwise logistic regression model takes the dichotomous outcome variable entered, and chooses the candidate variable most correlated with this outcome variable. It then enters this candidate variable into the program. After adjusting for this first candidate variable, the program chooses the candidate variable that next best correlates with the outcome variable. The program continues in this manner until there are no additional candidate variables that meet the 0.05 significance level for entry into the model.

III. RESULTS

A. RESPONSE RATES

1. Mailed Survey

Of the 1,500 pediatric dentists chosen by random sample to receive a survey, 971 returned a survey, for an overall response rate of 64.7%. This includes respondents who returned their survey after either the first or the second mailing, and those who returned their

survey after being contacted by telephone. There were 19 respondents who returned a survey after being contacted by telephone. The remaining 952 surveys were returned after either the first or second mailing. Some people returned the first survey after being prompted by the second one; therefore we do not have separate response rates.

A total of 872 surveys were used in the data analysis. Surveys were excluded for the following reasons: 1) the pediatric dentist had retired or was no longer seeing patients, 2) the pediatric dentist no longer practiced in the United States, or 3) the pediatric dentist did not regularly see adolescent patients. Eighty surveys were excluded because the pediatric dentist was no longer seeing patients or was no longer practicing in the U.S.; 19 surveys were excluded because the respondent reported seeing no adolescents on a regular basis.

2. Telephone Follow-Up of Non-Responders

Of the 130 pediatric dentists (of the 551 nonresponders) chosen by random sample to be contacted by telephone, 93 were reached. This represented 71.5% of the telephone sample (93/130), 16.9% (93/551) of the nonresponders, and 6.2% of the entire random sample (93/1500).

The 37 pediatric dentists who were not reached by telephone were unavailable for the following reasons: 17 were unavailable when contacted at least twice by phone, and attempts to have the doctor return telephone calls, e-mails, or faxes were unsuccessful. Eight had telephone numbers that were no longer correct or in service, 6 were no longer members of the AAPD, and 3 had moved and left no forwarding information. Three pediatric dentists did not wish to give out any information over the telephone.

B. SURVEY RESULTS

In all tables, numbers have been rounded to whole percentages, so they may not add to 100% due to rounding.

1. Specific Aim 1

Specific Aim 1 was (a) to generate descriptive statistics to describe the overall study sample, and specifically to characterize pediatric dentists' (b) practices, (c) attitudes, and (d) knowledge related to tobacco use prevention and cessation among adolescent patients (ages 11-17) in their practices.

Specific Aim 1a: Description of Study Sample

Table 1 shows that the mean and median age of respondents was 45 years, with a range of 28-81 years. The mean and median year of graduation from dental school was 1979, with a range from 1941-1998. The mean number of hours of training received in tobacco prevention and cessation was 10, with a range of 1 to 40 hours. More than three-fifths (61%) of all pediatric dentists with training received their training through a continuing education (CE) course. An equal number of pediatric dentists with training (36%) received their training in pediatric dentistry residency training programs and in dental school curriculum.

Table 1: Characteristics of Responding Pediatric Dentists

Characteristic	n	(%)
Age (years) (n = 858)		
≤ 39	264	31%
40-49	277	32%
≥ 50	317	37%
Gender (n = 872)		
Male	651	75%
Female	221	25%
Ethnic Group (n = 868)		
White	750	86%
Asian / Pacific Islander	51	6%
Latino	30	3%
African American	17	2%
Other	16	2%
Native American	4	1%
Year of Graduation from Dental School (n = 862)		
Prior to 1975	304	35%
1975-1985	294	34%
After 1985	264	31%
Training* (n = 864)		
Received training in tobacco use prevention or cessation	103	12%

*Respondents were allowed to check as many means of previous training as applicable.

Table 2: Tobacco Use Status of Responding Pediatric Dentists

Tobacco Product	Current User* n	(%)	Former User n	(%)	Never Used** n	(%)
Cigarettes (n = 844)	15	(2%)	144	(17%)	685	(81%)
Cigars (n = 833)	77	(9%)	29	(4%)	727	(87%)
Pipes (n = 823)	6	(1%)	59	(7%)	758	(92%)
Smokeless Tobacco (n = 817)	5	(1%)	10	(1%)	802	(98%)

* Current User includes current daily and current occasional users.

** Never Used includes those who experimented and those who never used.

Table 3: Practice Characteristics of Responding Pediatric Dentists

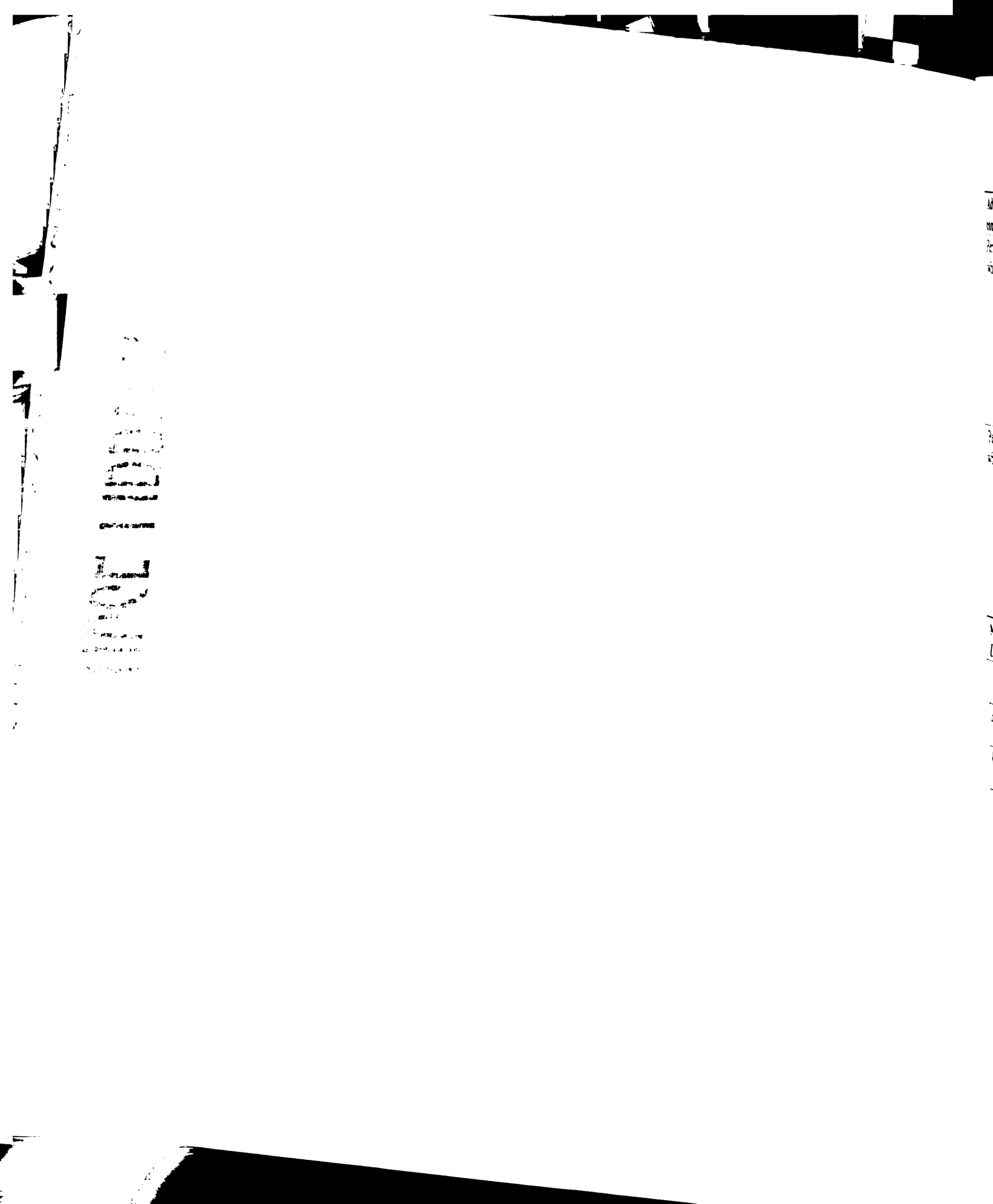
Characteristic	n	(%)	/	n	%
Type of Practice (n = 440)					
Solo	233	(53%)			
Group	191	(43%)			
Other	16	(4%)			
Setting of Practice (n = 815)					
Private	724	(89%)			
Academic	46	(6%)			
Hospital	20	(3%)			
Military	10	(1%)			
Public Health	10	(1%)			
Location of Practice (n = 865)					
Urban (pop. ≥ 300,000)	376	(44%)			
Suburban (> 2,500 but < 300,000)	477	(55%)			
Rural (≤ 2,500)	12	(1%)			
Days Worked per Week (n = 799)					
One	26	(3%)			
Two	35	(4%)			
Three	68	(9%)			
Four	353	(44%)			
Five	292	(37%)			
Six	25	(3%)			
Office Tobacco Policy					
No tobacco use by patients & parents (n = 862)	852	(99%)			
No tobacco use by staff (n = 865)	848	(98%)			
Person Responsible for Asking* (n = 867)					
Pediatric Dentist	583	(67%)			
Hygienist	293	(34%)			
Dental Assistant	241	(28%)			
Do Not Ask	*147*	*(17%)*			
Health History form	126	(15%)			
No one person	115	(13%)			
Receptionist	13	(2%)			
Other (Dental Student)	1	(0.1%)			
Patient Load (per day): (n = 859 / 850)	**All patients**			**adolescent patients**	
	n	(%)	/	n	%
< 10	28	(3%)		408	(48%)
10-20	214	(25%)		353	(42%)
21-30	221	(26%)		62	(7%)
31-40	177	(20%)		8	(1%)
> 40	219	(26%)		19	(2%)

* Respondents were not limited in the number of people they could check.

In Table 4, 4% of pediatric dentists identified tobacco users by some other means, including asking high-risk patients such as baseball players, asking siblings about family use, and checking fingers for nicotine stains. One asked verbally about tobacco use during the new patient exam, and a couple asked only if suspicious.

Table 4: Tobacco Use Prevention and Cessation Habits of Responding Pediatric Dentists

Habit	n	(%)
Identification (n = 870)		
Did not identify tobacco users	100	(11.5%)
Identified tobacco users	770	(88.5%)
Methods of identification*		
Detected tobacco odor	702	(81%)
Looked for oral symptoms	677	(78%)
Asked patients	390	(45%)
Was alerted by parents	278	(32%)
Asked on Health History form	181	(21%)
Asked parents	122	(14%)
Other	35	(4%)
Documentation of tobacco use status for adolescent tobacco users (n = 848)		
Always	302	(35%)
Often	127	(15%)
Sometimes	150	(18%)
Never	269	(32%)
Asked Adolescent Patients in the 3 months prior to completing survey		
Percent of patients asked about *smoking* (n = 835)		
91-100	41	(5%)
75-90	28	(3%)
51-74	23	(3%)
25-50	34	(4%)
11-24	74	(9%)
1-10	410	(49%)
None	225	(27%)
Percent of patients asked about *smokeless tobacco use* (n = 810)		
91-100	31	(4%)
75-90	26	(3%)
51-74	14	(2%)
25-50	25	(3%)
11-24	44	(5%)
1-10	306	(38%)
None	364	(45%)



Advised Adolescent Tobacco Users in the 3 months prior to completing survey	
Percent of *smokers* advised to stop by respondents who had patients who smoked (n = 653)	
91-100	491 (75%)
75-90	11 (2%)
51-74	3 (0%)
25-50	5 (1%)
11-24	6 (1%)
1-10	73 (11%)
None	64 (10%)
Percent of *smokeless tobacco users* advised to stop by respondents who had patients who used smokeless tobacco (n = 511)	
91-100	392 (77%)
75-90	7 (1%)
51-74	2 (0.5%)
25-50	0 (0%)
11-24	2 (0.5%)
1-10	40 (8%)
None	68 (13%)

Assisted Adolescent Tobacco Users	Frequency of provision of service			
	Always n (%)	Often n (%)	Sometimes n (%)	Never n (%)
Encouraged them to set quit date (n = 837)	67 (8%)	62 (7%)	168 (20%)	540 (65%)
Provided self-help or educational materials (n = 837)	96 (12%)	85 (10%)	176 (21%)	480 (57%)
Referred to cessation clinic (n = 835)	31 (4%)	36 (4%)	117 (14%)	651 (78%)
Provided follow-up (n = 828)	33 (4%)	42 (5%)	122 (15%)	631 (76%)
Recommended nicotine gum (n = 828)	20 (2%)	32 (4%)	152 (18%)	624 (76%)
Recommended nicotine transdermal patch (n = 831)	18 (2%)	35 (4%)	126 (15%)	652 (79%)

* Respondents were not limited in the number of methods they could check.

Table 5: Respondents' Feelings of Preparation to Provide Tobacco Prevention and Cessation Services

	Level of preparation			
	Very well prepared	Well prepared	Minimally prepared	Unprepared
Service	n (%)	n (%)	n (%)	n (%)
Ask about tobacco use (n = 853)	292 (34%)	295 (35%)	223 (26%)	43 (5%)
Advise users to quit (n = 852)	255 (30%)	291 (34%)	248 (29%)	58 (7%)
Assist users with quitting (n = 846)	51 (6%)	95 (11%)	408 (48%)	292 (35%)

Specific Aim 1b: Practices

Table 6 shows that almost one-quarter of all surveyed pediatric dentists reported that they regularly (always or often) asked their adolescent patients about tobacco use, and over three-quarters asked at least sometimes. With regard to advising known tobacco users to quit, over 60% reported that they always advised their adolescent patients to quit, and well over three-quarters reported that they advised at least sometimes. In contrast, however, almost half of the pediatric dentists surveyed reported never assisting known tobacco users with the quitting process.

Table 6: Percentage of Pediatric Dentists Who Ask, Advise, and Assist Adolescents Regarding Tobacco Use
(n = 872)

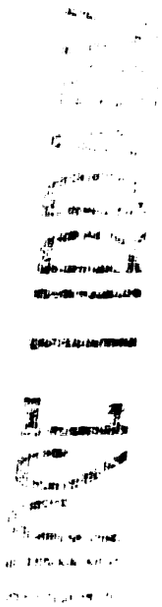
	Ask All Patients		Advise Known Users to Quit		Assist Known Users with Quitting	
	n	(%)	n	(%)	n	(%)
Always	92	(11%)	542	(62%)	112	(13%)
Often	115	(13%)	80	(9%)	92	(11%)
Sometimes	457	(52%)	88	(10%)	206	(24%)
Never	193	(22%)	146	(17%)	431	(49%)
Missing	15	(2%)	16	(2%)	31	(4%)

Specific Aim 1c: Attitudes

Table 7 shows that 91% of pediatric dentists surveyed agreed (strongly agreed or agreed) with the statement that pediatric dentists should not use tobacco. Seventy-six percent of pediatric dentists agreed that pediatric dentists should encourage abstinence of tobacco. Over half agreed that pediatric dentists should ask about tobacco use, and that it is the responsibility of pediatric dentists to both help patients who wish to quit to do so, and to convince patients who use tobacco to stop. Despite the feeling implied by these responses that pediatric dentists should become involved in tobacco cessation, well over half of the pediatric dentists surveyed agreed that adolescents will not give up tobacco use even if their pediatric dentist tells them to. More pediatric dentists disagreed (strongly disagreed or disagreed) that adolescents can stop tobacco use than agreed with the statement, and over half agreed that adolescents become addicted to nicotine. Yet less than one in five respondents felt that a pediatric dentist's time can be better spent doing things other than trying to reduce tobacco use among adolescent patients.

Table 7: Responses of Pediatric Dentists Toward Tobacco Control Activities
(n = 872)

Response	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)	Missing n (%)
Responsibility to convince pts to quit	152 (17%)	319 (37%)	201 (23%)	128 (15%)	60 (7%)	12 (1%)
Responsibility to help pts quit	138 (16%)	344 (39%)	236 (27%)	106 (12%)	37 (4%)	11 (1%)
Other aspects of practice more important	49 (6%)	124 (14%)	296 (34%)	296 (34%)	86 (10%)	21 (2%)
Adolescents can stop tobacco use	76 (9%)	240 (28%)	200 (23%)	271 (31%)	64 (7%)	21 (2%)
Dentists should not use tobacco	624 (72%)	169 (19%)	45 (5%)	7 (1%)	14 (2%)	13 (2%)
Adolescents will not quit on advice of dentists	161 (19%)	387 (44%)	213 (24%)	86 (10%)	7 (1%)	18 (2%)
Adolescents become addicted to nicotine	117 (13%)	348 (40%)	242 (28%)	127 (15%)	22 (3%)	16 (2%)
Adolescents have enough problems w/o giving up tobacco	13 (2%)	23 (3%)	98 (11%)	401 (46%)	234 (37%)	13 (2%)
Dentists should speak publicly about tobacco use	69 (8%)	298 (34%)	345 (40%)	115 (13%)	30 (3%)	15 (2%)
Dentists should ask about tobacco use	149 (17%)	416 (48%)	246 (28%)	36 (4%)	10 (1%)	15 (2%)
Dentists should encourage tobacco abstinence	281 (32%)	386 (44%)	154 (18%)	34 (4%)	4 (1%)	13 (2%)



Specific Aim 1d: Knowledge

Table 8 reveals that only one question was answered correctly by more than half of the responding pediatric dentists.

Table 8: Percentage of Pediatric Dentists Who Knew the Following Information*
(n = 872)

Information	n	(%)
One in three U.S. adolescents uses tobacco by age 18.	527	(60%)
90% of first-time cigarette use occurs before high school graduation.	348	(40%)
Every day, more than 1000 U.S. adolescents become regular smokers.	311	(36%)
In the last 25 years the number of U.S adolescents using smokeless tobacco has tripled.	168	(19%)

*Missing responses were counted as incorrect.

2. Specific Aim 2

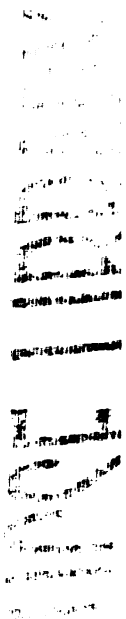
Specific Aim 2 was to identify barriers to the implementation of tobacco use prevention and cessation. We hypothesized that:

a. The biggest barrier would have at least 75% of respondents reporting that it was at least somewhat of a barrier.

b. Lack of time would be the major barrier identified.

c. A feeling of less preparation to ask, advise, or assist tobacco users would be negatively associated with the implementation of the respective practice.

d. Perception of importance with regard to tobacco use prevention or cessation practices would be associated with the implementation of the respective practice.



Hypotheses 2a,b: Barriers

Table 9 shows that, contrary to Hypothesis 2a, no one barrier to helping adolescent patients stop tobacco use was identified by at least 75% of respondents, and contrary to Hypothesis 2b, lack of time was not the major barrier identified. However, almost 70% of respondents reported that their feeling that patients are resistant to cessation services was a major barrier to helping adolescent patients stop tobacco use. Through a one sample test of the population proportion we found that there is a statistically significant difference for this population, at the 0.05 level, between 70% and 75%. Moreover, 61% identified, as a major barrier, the feeling that they could not effectively help patients quit. A lack of resources, reflected in not knowing where to send patients for counseling, and not having materials to hand out, was identified as a major barrier by at least half of the respondents. Fewer than half of the respondents identified lack of time as a barrier, and only about one-third identified lack of adequate reimbursement.

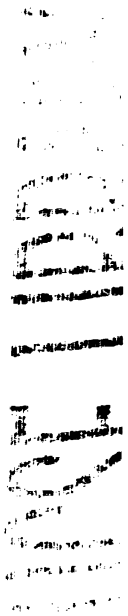


Table 9: Barriers to Helping Adolescent Patients Stop Tobacco Use As Reported by Pediatric Dentists*
(n = 872)

Barrier	n	(%)
Feel patients are resistant to cessation services	608	(70%)
Don't know where to send patients for counseling	550	(63%)
Don't feel could effectively help patients quit	532	(61%)
Don't have materials to hand out	435	(50%)
Lack of time	405	(47%)
Most adolescent patients do not use tobacco	395	(45%)
Did not occur to me to provide these services	322	(37%)
Don't know what to say	320	(37%)
Lack of adequate reimbursement	285	(33%)
Unsuccessful in providing these services in past	251	(29%)
Don't feel this is appropriate for a pediatric dentist	233	(27%)

*Respondents were asked how much of a barrier each of the following is, or would be, with regard to helping adolescent patients stop tobacco use. Responses included: not a barrier, somewhat of a barrier, a strong barrier. Missing responses were combined with 'not a barrier' responses.

Hypothesis 2c: Preparation

Table 10 shows that, in agreement with Hypothesis 2c, feeling prepared to perform a certain practice was highly associated with performing the respective practice. Those pediatric dentists who felt prepared to ask, advise, and assist were 5, 3, and 7 times more likely, respectively, to perform the respective task than those who felt unprepared to ask, advise, and assist.

Table 10: Association Between Performing Tobacco Control Behavior and Perception of Preparation
(n = 872)

Behavior Performed	% who felt prepared (P) or unprepared (U) who performed the behavior	Odds Ratio	(95% Confidence Interval)
Ask	31% (P) 9% (U)	5	(3.0 - 8.2)
Advise	81% (P) 58% (U)	3	(2.3 - 4.4)
Assist	59% (P) 17% (U)	7	(4.6 - 10.5)

Hypothesis 2d: Importance

Table 11 shows that, in accord with Hypothesis 2d, performance of each tobacco control behavior was highly associated with the perception that the behavior is important. Those respondents who felt that it was important to ask adolescent patients about tobacco use, advise adolescent users to quit, and assist users with quitting were 8, 2, and 4 times more likely, respectively, to perform the respective task than those who felt that the behavior was unimportant.

Table 11: Association Between Performing Tobacco Control Behavior and Perception of Importance
(n = 872)

Behavior Performed	% who felt the behavior was important (I) or unimportant (U) who performed the behavior	Odds Ratio	(95% Confidence Interval)
Ask	34% (I) 6% (U)	8	(4.7 - 14.3)
Advise	80% (I) 65% (U)	2	(1.6 - 3.0)
Assist	34% (I) 12% (U)	4	(2.6 - 5.8)

3. Specific Aim 3

Specific Aim 3 was to identify methods of tobacco use prevention and cessation education that pediatric dentists would be willing to participate in or provide. Based on the Healthy People 2000 Objective, we hypothesized that:

a. At least 75% of respondents who did not already ask, encourage, or provide materials for **non-users** would indicate a willingness to provide the respective service to their adolescent patients.

b. At least 75% of respondents who did not already advise, discuss, encourage, provide materials, refer, and provide follow-up would indicate a willingness to provide the respective service to their adolescent **tobacco users**.

c. Fewer than 75% of respondents who did not already recommend nicotine gum or patches would indicate a willingness to provide the respective service to their adolescent **tobacco users**.

d. Fewer than 75% of respondents with no previous tobacco use prevention or cessation training would indicate a willingness to receive such training.

Hypotheses 3a,b,c: Willingness

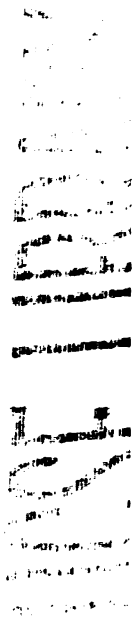
Table 12 shows that over half of all pediatric dentists who did not participate in tobacco prevention and cessation services were willing to do so. Those activities requiring the least amount of participation by the pediatric dentist in actual cessation, such as education, awareness-raising, and referral, were more preferable. Hypotheses 3a and 3c were supported by our results. Hypothesis 3b was partially supported: at least 75% of respondents who did not already advise, provide materials, and refer were willing to do so; however fewer than 75% were willing to discuss, encourage, or provide follow-up.

Table 12: Percent of Pediatric Dentists Willing to Provide Each Service, Who Do Not Already Do So*

Activity	n	(%)
Provide tobacco use prevention educational materials (n = 420)	364	(87)
Encourage non-users to remain tobacco free (n = 275)	236	(86)
Ask patients about tobacco use (n = 175)	141	(81)
† Advise patients to quit (n = 131)	114	(87)
Provide self-help or educational materials (n = 409)	344	(84)
Refer patients to cessation clinics/programs (n = 514)	398	(77)
Discuss specific strategies for quitting (n = 364)	269	(74)
Encourage patients to set a quit date (n = 426)	312	(73)
Provide follow-up for patients trying to quit (n = 494)	325	(66)
Recommend nicotine gum (n = 484)	282	(58)
Recommend nicotine transdermal patch (n = 505)	279	(55)

* All questions refer to adolescent patients.

† All of the following services refer to adolescent patients who use tobacco.



Hypothesis 3d: Training

Table 13 shows that, in accordance with Hypothesis 3d, the great majority of pediatric dentists with no previous tobacco use prevention or cessation training were willing to receive such training.

Table 13: Percent of Pediatric Dentists With No Previous Tobacco Use Prevention or Cessation Training Who Were Willing To Receive Training
(n = 750)

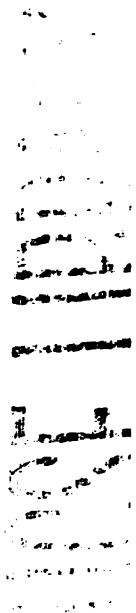
Willingness to Receive Training	n	(%)
Willing	527	(70%)
Unwilling	223	(30%)

4. Telephone Follow-Up of Non-Responders

Ninety-three pediatric dentists were contacted by telephone, and 19 (21%) subsequently returned a survey. Of those 19, 14 indicated during the telephone interview that they had never received a survey. A total of 17 of the 93 pediatric dentists (18%) contacted by telephone indicated that they had not received the survey. Therefore, had we been able to contact a greater number of non-responders, we may have increased our response rate.

After being contacted by telephone, females were more likely than males to return the survey: 82% of those who were contacted by telephone and returned the survey were female, while just 18% were male. Just over 25% of the total respondents to the survey were female.

Compared to those pediatric dentists who returned a survey after being contacted by telephone (phoned respondents), those who did not return a survey (phoned non-



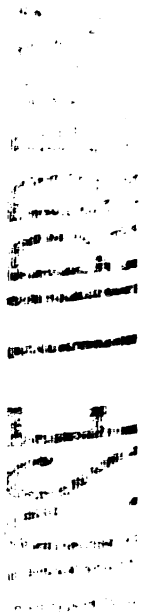
respondents) were significantly more likely to say in the telephone interview that they had no time, (43% of phoned non-respondents vs. 16% of phoned respondents) that tobacco use was not a problem in their office, (9.5% of phoned non-respondents vs. none of the phoned respondents) and that they were not interested in participating (23% of phoned non-respondents vs. none of the phoned respondents). We did not find a statistically significant difference between the percentage of non-responders and responders who thought that tobacco control was not an appropriate topic for pediatric dentists.

We found no differences between phoned non-responders and phoned responders in terms of year of graduation from dental school, age, ethnicity, doctor's use of tobacco (both current and past), and tobacco use allowed in office.

5. Specific Aim 4

Specific Aim 4 was to identify predictors related to the delivery of tobacco use prevention and cessation services in pediatric dental practices. We hypothesized that provision of tobacco use services would be predicted by year of graduation from dental school, geographic location, amount of state cigarette tax, statewide prevalence of adult smoking, health care provider tobacco use, training in tobacco intervention strategies (previous training and willingness to receive training), intervention self-efficacy (feeling of preparedness to ask, advise, and assist tobacco users), and attitude.

We looked at the following tobacco use prevention and cessation services: asking adolescent patients about tobacco use (question #15a), advising known adolescent



tobacco users to quit (question #16a), and assisting known adolescent users with quitting (question #16b through and including #16h). Throughout the remainder of the text, these services are referred to as asking, advising, and assisting, respectively.

In summary, we found that, except for the few variables that follow, all of the variables were predictive of provision of at least one of the three services (asking, advising, or assisting) to at least some patients. The variables that did *not* predict asking, advising, or assisting in any of our models were: amount of statewide cigarette tax, willingness to receive training, a feeling of preparedness to *assist* users with quitting, seven of the individual attitude questions from question #22 (#'s d-i and k), and setting of practice (rural, suburban or urban). The following additional variables were found to be predictive of provision of services: female gender, identification of tobacco users (any affirmative answer to question #11), documentation of tobacco users' status in the dental chart, and policy on staff's in-office tobacco use. A multivariable analysis of predictors follows in the section entitled Logistic Regression Analysis.

CORRELATION ANALYSIS

The strongest correlation found was that those pediatric dentists who discussed specific strategies for quitting were *less* likely to assist users with quitting (Spearman correlation: $r_s = -0.72$). Although this was not expected, we found that for each of the individual assisting variables (e.g. encouraging patients to set a quit date, providing educational materials, recommending nicotine replacement therapy) those pediatric dentists who

participated in each activity were less likely to assist (for all, $r_s \leq -0.41$; $p<0.001$). They were also less likely to either ask, or to advise (for both, $r_s \leq -0.24$; $p<0.001$).

Those pediatric dentists who either encouraged non-users to remain tobacco free or who documented tobacco use in their patients' charts were also *less* likely to ask, advise, or assist. Similarly, pediatric dentists who had tobacco use prevention education materials available for patients were *less* likely to ask or assist. This may be due to a perceived (or real) lack of actual users in their practices. However, these correlations are clearly counterintuitive and require further research.

We found moderately positive correlations (r_s between 0.4-0.6) between pediatric dentists who asked in the 3 months prior to the survey about smoking or smokeless tobacco use with the likelihood of asking, advising, and assisting. This is what we expected: that those pediatric dentists who regularly asked about tobacco use were more likely to be involved in tobacco use prevention and cessation.

Throughout our correlation analysis, we found that age and year of graduation were strongly inversely related; that is, older pediatric dentists were likely to have graduated from dental school in earlier years. We also found an inverse relationship between statewide smoking prevalence and statewide cigarette tax; that is, as smoking prevalence increased, tax decreased. For example, although weakly correlated (for ask and prevalence, $r_s = 0.15$, $p<0.001$; for ask and tax, $r_s = -0.09$, $p<0.01$), those pediatric dentists who were more likely to ask adolescent patients if they use smokeless tobacco were more likely to live in a state with both a high smoking prevalence and a low cigarette tax.

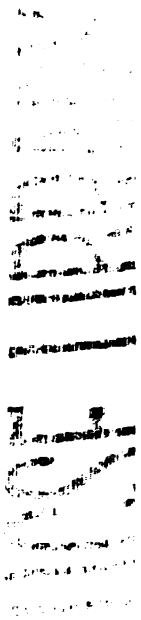
It is interesting to consider why cigarette tax and prevalence might be both correlated to our test variables, and inversely related to each other. Clearly, in states with a higher prevalence, smoking is more ubiquitous. This might contribute to or result in a lower tax. Pediatric dentists in these states might therefore be more aware of the need to be active in tobacco use prevention and cessation than their colleagues in states where smoking prevalence is lower (and therefore less pervasive), and where cigarette taxes are higher (and therefore more of a barrier to purchasing tobacco). However, we cannot conclude causality; that is, we do not know whether higher taxes cause lower prevalence, whether lower prevalence means voters want, demand or tolerate higher taxes, or whether there is no causality between taxes and prevalence.

CHI-SQUARE ANALYSIS

For all of the Chi-square analyses, performance of the behavior was indicated by a response of 'always' or 'often', while a response of 'sometimes' or 'never' indicated that the behavior was not performed.

Table 14: Gender: Chi-Square Analysis

Behavior Performed	% of Males (M) and Females (F) who performed each behavior	Odds Ratio	95% Confidence Interval
Ask	21% (M) 33% (F)	1.9	1.3-2.7
Advise	71% (M) 78% (F)	1.4	1.0-2.0
Assist	22% (M) 30% (F)	1.5	1.0-2.2



In the chi-square analysis in Table 14, females are almost twice as likely as males to ask patients about tobacco use, and are about 1½ times as likely as males to both advise users to quit, and to assist users with quitting.

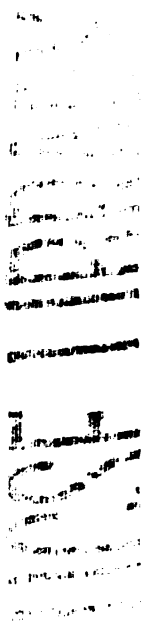
Table 15: Current Tobacco Users: Chi-Square Analysis

Behavior Performed	% of Pediatric Dentists who were Current tobacco users, vs. Noncurrent users (Former + Never), who performed each behavior. Current (C); Noncurrent (F+N)	Odds Ratio	95% Confidence Interval
Ask	20% (C) 25% (F+N)	0.8	0.5-1.3
Advise	73% (C) 73% (F+N)	1.0	0.6-1.6
Assist	19% (C) 25% (F+N)	0.7	0.4-1.2

Table 15 shows that noncurrent tobacco users (former users and those who have never used) are slightly more likely than current tobacco users to ask about tobacco use and to assist users with quitting. These two groups are equally as likely to advise users to quit.

Table 16: Current + Former Tobacco Users: Chi-Square Analysis

Behavior Performed	% of Pediatric Dentists who had Ever used tobacco (Current + Former users), vs. those who had Never used, who performed each behavior. Ever (C+F); Never (N)	Odds Ratio	95% Confidence Interval
Ask	24% (C+F) 25% (N)	0.9	0.7-1.3
Advise	74% (C+F) 72% (N)	1.1	0.8-1.6
Assist	20% (C+F) 26% (N)	0.7	0.5-1.1



The chi-square analysis for Table 16 shows that those pediatric dentists who have never used tobacco are slightly more likely to ask about tobacco use, and to assist users with quitting; however pediatric dentists who have ever used tobacco (current + former users) are slightly more likely to advise users to quit.

Table 17: Previous Training: Chi-Square Analysis

Behavior Performed	% of Pediatric Dentists with training (T), vs. those with no training (NT), who performed each behavior	Odds Ratio	95% Confidence Interval
Ask	40% (T) 22% (NT)	2.4	1.5-3.8
Advise	82% (T) 71% (NT)	1.8	1.0-3.3
Assist	49% (T) 21% (NT)	3.5	2.2-5.6

Table 17 shows that compared to pediatric dentists who had not received previous training in tobacco use prevention and cessation, those with training were almost twice as likely to advise users to quit, 2½ times as likely to ask patients about tobacco use, and 3½ times as likely to assist users with quitting.

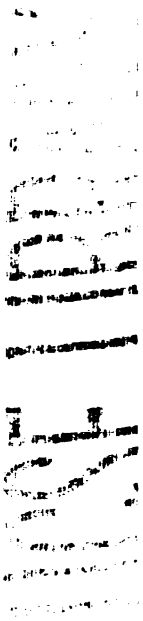


Table 18: Willingness to Receive Training: Chi-Square Analysis

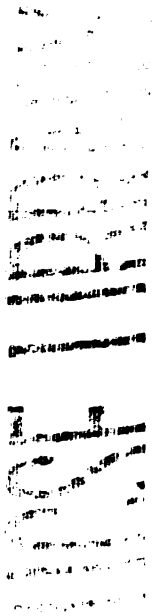
Behavior Performed	% of Pediatric Dentists without training who were willing to receive training (W), vs. those who were unwilling (U), who performed each behavior	Odds Ratio	95% Confidence Interval
Ask	26% (W) 20% (U)	1.4	1.0-2.1
Advise	77% (W) 64% (U)	1.8	1.3-2.6
Assist	27% (W) 17% (U)	1.8	1.2-2.7

We asked pediatric dentists who had no previous tobacco use prevention or cessation training if they would be willing to receive this type of training. In Table 18, we found that, compared to pediatric dentists who were unwilling to receive training, those who were willing to receive training were also 1½ times as likely to ask about tobacco use, and almost twice as likely to advise users to quit and to assist them with quitting.

Table 19: Region of the U.S.: Pacific: Chi-Square Analysis

Behavior Performed	% of Pediatric Dentists in the Pacific region of the country, vs. Central + Atlantic regions, who performed each behavior. Pacific (P); Central + Atlantic (C+A)	Odds Ratio	95% Confidence Interval
Ask	17% (P) 26% (C+A)	0.6	0.4-0.9
Advise	63% (P) 75% (C+A)	0.6	0.4-0.8
Assist	19% (P) 26% (C+A)	0.7	0.5-1.1

Table 19 shows that pediatric dentists practicing in the Pacific region of the country (see Appendix G for a definition of the states in each region) were slightly less likely than



those practicing in the Central + Atlantic regions to ask about tobacco use, advise users to quit, or assist users with quitting.

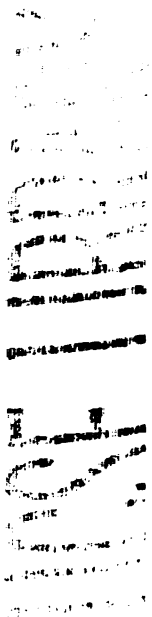
Table 20: Region of U.S.: Atlantic: Chi-Square Analysis

Behavior Performed	% of Pediatric Dentists in the Atlantic region of the country, vs. Central + Pacific regions, who performed each behavior. Atlantic (A); Central + Pacific (C+P)	Odds Ratio	95% Confidence Interval
Ask	26% (A) 23% (C+P)	0.8	0.6-1.2
Advise	76% (A) 71% (C+P)	0.8	0.6-1.1
Assist	25% (A) 24% (C+P)	0.9	0.7-1.3

Table 20 shows that pediatric dentists practicing in the Atlantic region of the U.S. (again, see Appendix G for a definition of the states in each region) were slightly less likely than those practicing in the Central + Pacific regions to ask about tobacco use, advise users to quit, or assist users with quitting.

LOGISTIC REGRESSION ANALYSIS

In our logistic regression analysis, we created a total of 12 models: 4 models for each of the 3 outcome variables (ask, advise, and assist). All 4 models adjusted for 2 barriers (strongly vs. somewhat or not) associated with non-response: lack of time and lack of tobacco users in the practice. Models all included the following candidate variables: year of graduation from dental school, geographic location (Pacific or Central region; Atlantic region was the reference cell; see Appendix G for definition of regions), amount of state cigarette tax, statewide prevalence of adult smoking, health care provider tobacco use,



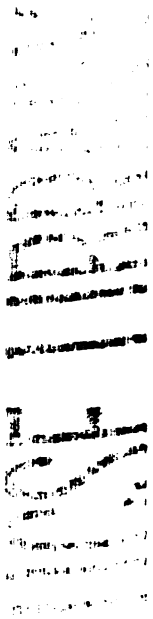
training (previous training and willingness to receive training), intervention self efficacy (feeling of preparedness to ask, advise, and assist), gender, office setting (urban or rural; suburban was the reference cell), office policy on staff tobacco use, and documentation.

Models I and II also included the candidate variable "identification of tobacco users" (survey question #11). Identification was defined as any positive response to question #11.

Question #22 (a-k) assessed respondents' attitudes. To evaluate whether attitude was predictive of involvement in tobacco use prevention or cessation, we looked at responses to both the individual questions, a-k, and at a summary of the responses, called the UC Scale. (Note: •Dolan, 1997, used a similar scale with items a-i; the UC Scale was a slightly stronger predictor than their scale.) Items c, f, and h were reverse-ordered for the scale.

Models I and III included the 11 candidate variables from question #22 (a-k), while Models II and IV included the candidate variable UC Scale.

For a candidate variable to become part of a model, it had to meet the 0.05 significance level for association with the outcome variable. A stepwise selection procedure was used. This accepts into the model the most correlated candidate variable first. Then it selects the most correlated remaining candidate variables meeting the 0.05 significance level after adjusting for the first variable. The program continues in this manner until



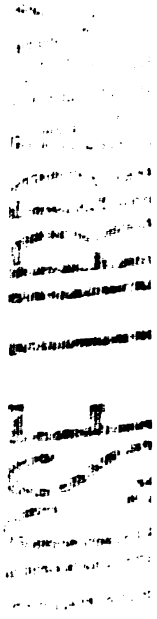
there are no additional candidate variables that meet the 0.05 significance level for entry into the model. Stepwise selection also checks that the variables that entered the model remain significant at the 0.05 level.

A brief summary of the results follows. The only candidate variable that predicted asking in 3 of the 4 models was a feeling of preparedness to ask. Specifically, 75% of pediatric dentists who always asked felt very well prepared to ask, while only 5% who felt unprepared to ask always did so.

Statewide smoking prevalence was predictive of advising in 3 of 4 models, and was predictive of assisting in all 4 models.

Identification of tobacco users was only included in Models I and II, and was predictive in both models of asking, advising, and assisting. When we look specifically at the overall data, among those pediatric dentists who did *not* identify tobacco users, 80% *never* asked about tobacco use, 65% *never* advised known users to quit, and 90% *never* assisted users with quitting. This is in contrast to pediatric dentists who identified tobacco users, where 15%, 11%, and 46%, respectively, *never* asked, advised, and assisted.

In Ask, Advise, and Assist Models I and II, documentation of adolescent tobacco users' status was predictive of asking, advising, and assisting. Specifically, while 20% of pediatric dentists who documented also regularly asked, only 4% who sometimes or never documented regularly asked. The same was true for advising and assisting: 45% who

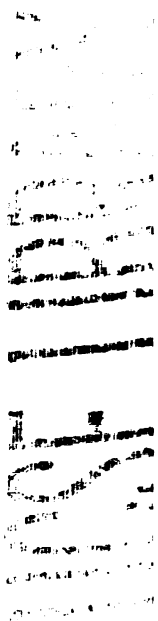


regularly documented also regularly advised users to quit, while 28% who sometimes or never documented advised users to quit. Nineteen percent who regularly documented also regularly assisted users with quitting, while just 5% who sometimes or never documented regularly assisted.

Over 70% of all pediatric dentists were willing to receive training. Although those who asked, advised, and assisted were, by straight percentages, more willing to receive training than those who did not participate in these tobacco control activities, willingness to receive training was not predictive. Past participation in tobacco use training was predictive of assisting in one model.

Models I and III included the 11 individual candidate variables from question #22 (a-k). In both Models I and III, question #22j ("It is important for a pediatric dentist to ask adolescent patients about tobacco use") was predictive of asking, advising, and assisting; question #22c* ("A pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients") was predictive of asking and assisting; question #22a ("It is a pediatric dentist's responsibility to convince patients who use tobacco to stop") was predictive of advising; and question #22b ("It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this") was predictive of assisting.

*Note: question #22c was reverse-ordered for the scale; therefore *disagreement* with this statement was predictive of asking and assisting.



In both Models II and IV, the variable UC Scale was predictive of asking, advising, and assisting. The UC Scale could be used as a simple means of evaluating pediatric dentists' attitudes toward involvement in tobacco use prevention and cessation.

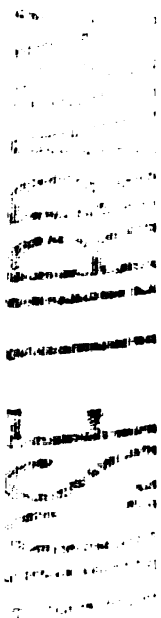
Doctor's current use of tobacco was predictive of assisting in 3 of 4 models, while a policy permitting staff tobacco use in the office was predictive of *lack* of involvement in assisting in 2 models. Year of graduation from dental school was predictive in one model of assisting, and in 2 models females were more likely to ask about tobacco use than males. Lastly, region of the country was predictive: compared to those living in the Atlantic or Central regions, pediatric dentists living in the Pacific region were *less* likely to *ask*, while those living in the Central region were *less* likely than those in the Atlantic or Pacific regions to *assist*.

A more detailed description of each final model follows.

Table 21: Ask - Model I

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
ID Users	12.4	5.5	28.0
Documentation	2.9	1.8	4.8
Preparation to Ask	1.9	1.2	3.0
Important to ask (#22j)	1.8	1.4	2.5
State Smoking Prevalence	1.1	>1.0	1.2

This model looked at the outcome variable Ask. The five candidate variables that met the 0.05 significance level to become part of the model, and that remained in the model, were

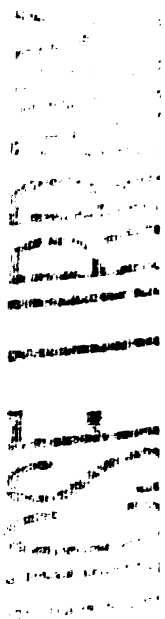


(in order of selection into the model): identification of tobacco users, documentation, preparedness to ask, "It is important for a pediatric dentist to ask adolescent patients about tobacco use" (#22j), and smoking prevalence.

If respondents answered in the affirmative to any part of survey question #11, regarding identification of tobacco users, they were 12 times more likely to ask about tobacco use. If respondents documented the habits of tobacco users in their charts, they were almost 3 times more likely to ask. If respondents felt well or very well prepared to ask, they were almost twice as likely to do so.

For survey questions #22 (a-k), there were 5 possible responses (from strongly agree to strongly disagree). Respondents who were *one* level 'higher' in their responses, (e.g. strongly agree versus agree) had one increase in their log odds of asking, advising, or assisting. For example, someone who *strongly agrees* with question #22j (that it is important for a pediatric dentist to ask adolescent patients about tobacco use) is: 1.8 times more likely to ask than someone who *agrees*; 3.4 times ($e^{(0.6076 \times 2)}$) more likely to ask than someone who is *neutral*; 6.2 times more likely to ask than someone who *disagrees*; and 11.4 times more likely to ask than someone who *strongly disagrees*.

Lastly, for every 1% that smoking prevalence increases between states, a pediatric dentist's log odds of asking increases by 0.08 times. Therefore a higher state smoking prevalence means that pediatric dentists in that state are more likely to ask. For example, if we compare pediatric dentists in Kentucky (smoking prevalence 30.8%) to pediatric



dentists in Utah (smoking prevalence 13.8%), those in Kentucky are 3.9 times more likely to ask ($e^{(0.0801 \times 17)}$).

Table 22: Ask - Model II

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
ID Users	12.1	5.6	25.9
Documentation	3.2	1.9	5.1
Preparation to Ask	2.2	1.4	3.4
UC Scale (#22)	1.1	>1.0	1.1

Again, the outcome variable was Ask. The candidate variables selected for inclusion and retention in the model, and predictive of asking, were: identification of tobacco users, documentation, preparedness to ask, and the UC Scale.

As with Model I, identification, documentation, and preparedness to ask were predictors of asking. In addition, a more positive response to the 11 questions comprising the UC Scale predicted asking. There was a potential range of points for the UC Scale from -22 to +22. For every additional point (from 1 to 2, from 2 to 3, etc.), respondents were 1.09 times more likely to ask. For example, someone who *strongly agreed* compared to someone who *agreed* with all 11 questions would be more than 2½ times more likely to ask about tobacco use ($1.09^{11} = 2.6$). Question #22 is therefore indicative of how respondents' attitudes surrounding the issue of tobacco influence the tobacco control activities in their practices.

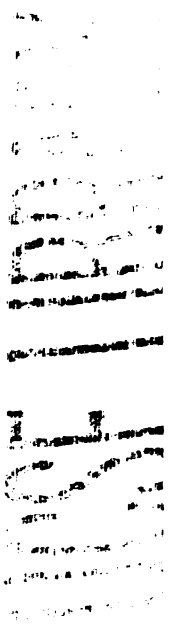


Table 23: Ask - Model III

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Gender - Female	1.7	>1.0	3.0
Preparation to Advise	2.5	1.7	3.8
Time better spent elsewhere (#22c)*	1.3	>1.0	1.6
Important to Ask (#22j)	2.1	1.6	2.8
Region: Pacific vs. Atlantic/Central	0.6	0.4	0.9

The candidate variables meeting the 0.05 inclusion and retention level in this model were: female gender, preparation to advise, "A pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients" (#22c*), "It is important for a pediatric dentist to ask adolescent patients about tobacco use" (#22j), and the Pacific region of the country.

*Note: question #22c was reverse-ordered for the scale; therefore *disagreement* with this statement was predictive.

The first four variables predicted asking. Females were almost twice as likely to ask as males, and a feeling of preparedness to advise made respondents 2½ times more likely to ask. However, pediatric dentists living in the Pacific region of the country were *less* likely to ask. This will become important as educators begin to tailor tobacco use prevention and cessation training to the needs of the pediatric dentists in the area.

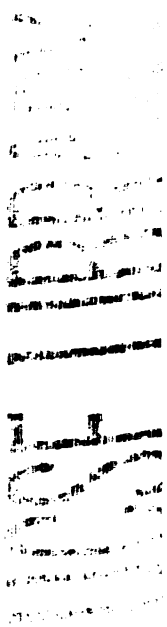


Table 24: Ask - Model IV

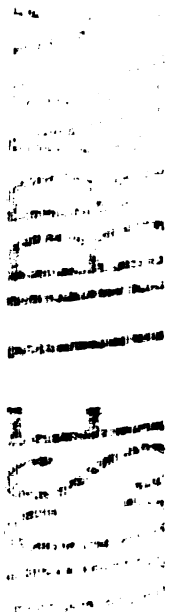
Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Gender - Female	1.9	1.1	3.3
Preparation to Ask	1.9	1.2	3.3
Preparation to Advise	1.8	1.1	3.0
UC Scale (#22)	1.1	1.1	1.2
Region: Pacific vs. Atlantic/Central	0.6	0.4	<1.0

The candidate variables selected for inclusion and retention in the model were: female gender, preparation to ask and to advise, the UC Scale, and living in the Pacific region of the country. Again, all variables *except* for living in the Pacific region were predictive of asking. This is one of two models in which gender was predictive of asking: female pediatric dentists were again almost twice as likely as males to ask patients about tobacco use.

Table 25: Advise - Model I

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
ID Users	13.5	6.5	28.0
Documentation	3.7	1.9	7.2
Preparation to Ask	2.2	1.3	3.7
Convince patients to stop (#22a)	1.4	1.1	1.8
State Smoking Prevalence	1.1	>1.0	1.2

The five candidate variables that met the 0.05 significance level to become and remain part of this model were: identification of tobacco users, documentation, preparation to ask, "It is a pediatric dentist's responsibility to convince patients who use tobacco to stop" (#22a), and statewide smoking prevalence.



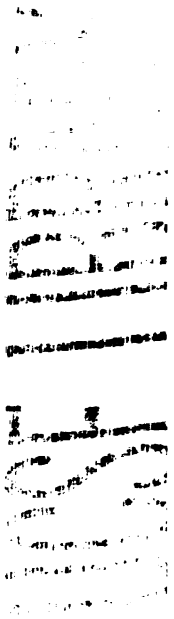
Those respondents who identified tobacco users (any positive response to question #11) were over 13 times more likely to advise users to quit compared with those who did not identify tobacco users. Those respondents who documented were almost 4 times as likely to advise users to quit as those who did not document.

For statewide smoking prevalence, for the percent increase in prevalence, respondents are $e^{(0.0930 \times \text{increase in prevalence})}$ more likely to advise users to quit.

Table 26: Advise - Model II

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Year of graduation	0.97	0.9	<1.0
ID Users	13.4	6.6	27.2
Documentation	4.2	2.1	8.2
Preparation to Ask	2.0	1.2	3.3
UC Scale	1.1	>1.0	1.2

The results of this model are similar, in terms of the candidate variables included and the odds ratios, to that of the previous model, Advise Model I. Three candidate variables that met the 0.05 significance level to become and remain part of this model were the same: identification of tobacco users, documentation, and preparation to ask. Once again, we found that respondents who identify tobacco users are about 13 times as likely to advise, and those who document tobacco use are more than 4 times as likely to advise. Those who feel very well or well prepared to ask about tobacco use are approximately twice as likely to advise users to quit.



This model (II) included the UC Scale, rather than the individual questions from #22, and the UC Scale was the fifth candidate variable included in the model and was predictive of advising. This means that for the 11 questions a-k, someone who *strongly agreed* compared to someone who *agreed* with all 11 questions would be almost three times more likely to advise a tobacco user to quit ($1.1^{11} = 2.9$).

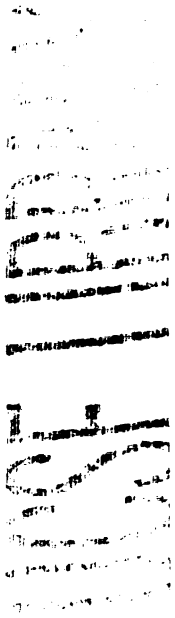
Table 27: Advise - Model III

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Preparation to Ask	2.7	1.7	4.3
Convince patients to stop (#22a)	1.4	1.1	1.7
Important to ask (#22j)	1.5	1.1	2.1
State Smoking Prevalence	1.1	>1.0	1.2

There were four candidate variables, all predictive of advising tobacco users to quit, that met the 0.05 significance level to become part of and remain in this model: feeling prepared to ask, more positive responses to the following two statements: "It is a pediatric dentist's responsibility to convince patients who use tobacco to stop" (#22a), and "It is important for a pediatric dentist to ask adolescent patients about tobacco use" (#22j), and statewide smoking prevalence.

Table 28: Advise - Model IV

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Preparation to Ask	2.8	1.8	4.4
UC Scale	1.1	1.1	1.2
State Smoking Prevalence	1.1	>1.0	1.2

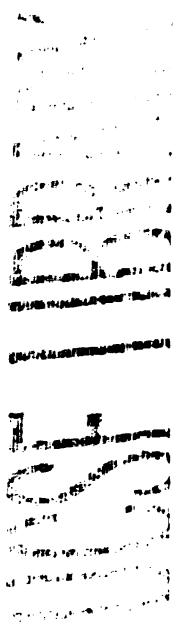


There were three candidate variables that met the 0.05 significance level to become part of and remain in this model. All were predictive of advising tobacco users to quit: feeling prepared to ask, the UC Scale, and statewide smoking prevalence. Respondents who felt prepared to ask were almost three times as likely to advise their patients to quit tobacco use. The odds ratio for the UC Scale was the same as Ask Models II and IV and Advise Model II.

Table 29: Assist - Model I

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Doctor's use of tobacco	2.1	1.1	3.8
ID Users	5.3	2.4	11.7
Documentation	2.4	1.6	3.5
Received tobacco training	2.1	>1.0	4.4
Preparation to Advise	1.8	1.2	2.6
Help patients stop (#22b)	1.5	1.2	1.8
Time can be better spent (#22c)	1.3	>1.0	1.5
State Smoking Prevalence	1.1	>1.0	1.2

Eight candidate variables met the 0.05 significance level to become part of and remain in this model. All were predictive of assisting users with the quitting process. As with previous models, identification of tobacco users was a strong predictor. Our model estimated a five-fold increase in assisting among those who identified users. Respondents who documented, who had received previous training in tobacco use cessation, or who felt prepared to advise users to quit were approximately twice as likely to assist users with quitting as those who did not document, had not received training, or



felt less prepared, respectively. Pediatric dentists who used tobacco were also twice as likely to assist users with quitting, compared to those who did not currently use.

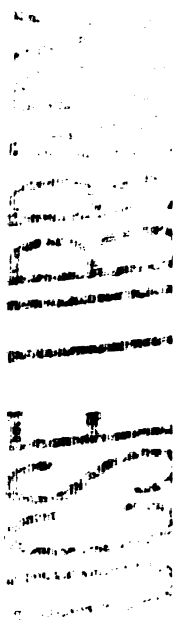
More positive responses to the following two statements were predictive of assisting: "It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this," (#22b) and "A pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients" (#22c*).

*This statement (#22c) was reverse-ordered; therefore *disagreement* was predictive.

Finally, pediatric dentists living in states with a higher prevalence of smoking were more likely to assist. For example, pediatric dentists in Kentucky (smoking prevalence 30.8%) were 5.0 times more likely to *assist* compared to pediatric dentists in Utah (smoking prevalence 13.8%) ($1.1^{17} = 5.0$). This finding is similar to Ask Model I, which found an odds ratio of 1.1 for the candidate variable smoking prevalence, and which found that pediatric dentists in Kentucky were 3.6 times more likely to *ask* than those in Utah.

Table 30: Assist - Model II

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Doctor's Use of Tobacco	2.2	1.2	3.9
ID Users	4.6	2.1	9.8
Documentation	2.3	1.6	3.4
Preparation to Advise	1.8	1.3	2.7
UC Scale	1.1	1.1	1.2
State Smoking Prevalence	1.1	>1.0	1.2



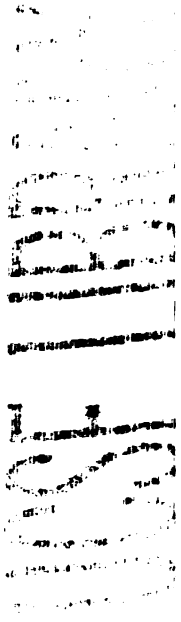
Six candidate variables, all predictive of assisting users with quitting, met the 0.05 significance level to become and remain part of this model. The first 4 variables and the final variable were found in the same order in Assist Model I, with similar or identical odds ratios. For all models in which the UC Scale was a candidate variable, it met the 0.05 significance level for inclusion and retention in the model, and had an odds ratio of 1.1.

Table 31: Assist - Model III

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Staff Tobacco Use	0.2	0.1	0.8
Preparation to Advise	2.3	1.6	3.3
Help patients stop (#22b)	1.5	1.3	1.9
Important to Ask (#22j)	1.6	1.2	2.0
Region: Central vs. Atlantic/Pacific	0.7	0.4	<1.0
State Smoking Prevalence	1.1	>1.0	1.2

There were 6 candidate variables selected for inclusion and retention in the model. Four of these variables were predictive of assisting: feeling prepared to advise, as well as more positive responses to the following two statements: "It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this," (#22b) and "It is important for a pediatric dentist to ask adolescent patients about tobacco use" (#22j).

In addition, as statewide smoking prevalence increased, likelihood of assisting also increased. This means that pediatric dentists practicing in states with a higher prevalence (and therefore who may have a greater percentage of patients using tobacco) were more likely to assist those users with quitting.



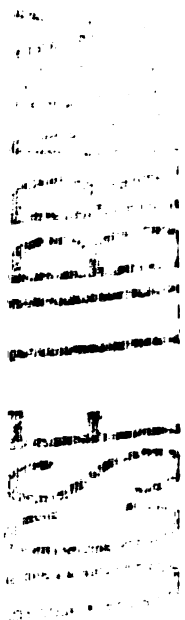
Two variables predicted less involvement with assisting. Pediatric dentists who allowed staff to use tobacco in the office were less likely to assist users with quitting. In addition, those pediatric dentists living in the Central region of the country were less likely to assist users with quitting, compared to those living in the Atlantic or Pacific regions.

Table 32: Assist - Model IV

Candidate Variable	Odds Ratio	95% Confidence Limits	
		Lower	Upper
Doctor's Use of Tobacco	1.9	1.1	3.2
Staff Tobacco Use	0.2	0.1	0.9
Preparation to Advise	2.4	1.7	3.5
UC Scale	1.1	1.1	1.2
Region: Central vs. Atlantic/Pacific	0.7	0.4	<1.0
State Smoking Prevalence	1.1	1.1	1.2

In the final model, 6 candidate variables met the 0.05 significance level for inclusion and retention. Four were predictive of assisting. As with Assist Models I and II, pediatric dentists who used tobacco were about twice as likely to assist users with quitting; however, doctor's use of tobacco was not predictive of asking or advising.

Pediatric dentists who felt prepared to advise tobacco users to quit were approximately 2½ times more likely to assist users with quitting. As previously stated, the UC Scale was predictive of asking, advising, and assisting in all models in which it was a candidate variable.



In all 4 assisting models as well as Ask Model I and Advise Models I, III and IV, smoking prevalence had an odds ratio of 1.1 and was predictive of assisting, asking, and advising, respectively.

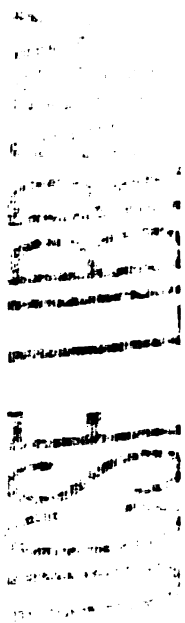
Lastly, as with Assist Model III, pediatric dentists who allow staff to use tobacco in the office are less likely to assist users with quitting. In addition, pediatric dentists living in the Central region of the country are less likely to assist users with quitting, compared to those living in the Atlantic or Pacific regions.

IV. DISCUSSION

A. SURVEY

Response Rates

Our response rate of 64.7% was comparable to or better than that of many other similar survey studies in the literature. The most comparable study to date was a survey on infant oral health care mailed to 1,500 members of the AAPD in 1996, which reported a response rate of 60.9%. (•Erickson, 1997) A survey mailed to dentists in Chittenden County, Vermont had a response rate of 61%. (•Secker-Walker, 1987) The authors of a 1997 Journal of the American Dental Association study mailed surveys to 3,999 dentists, and had a response rate of 43.7%. (•Dolan, 1997) A survey mailed to a convenience sample of 700 dentists in Maryland had a response rate of 35%. (•Fried, 1992)



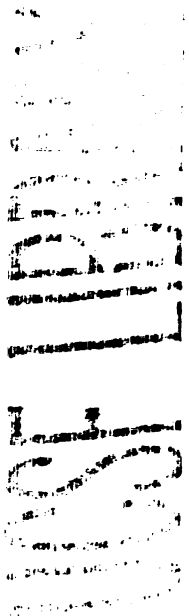
Characteristics of Responding Pediatric Dentists

Just 12% of the responding pediatric dentists had received training in tobacco use prevention or cessation. Our chi-square analysis shows that pediatric dentists with training are more likely than those without training to be involved in every aspect of tobacco use prevention and cessation: they are twice as likely to advise users to quit, 2½ times as likely to ask about tobacco use, and 3½ times as likely to assist users with quitting. This indicates a great need within the profession for suitable training classes. It also indicates the need for changes in the curricula of dental schools and pediatric dental residency training programs toward incorporation of tobacco use prevention and cessation techniques.

Tobacco Use Status of Responding Pediatric Dentists

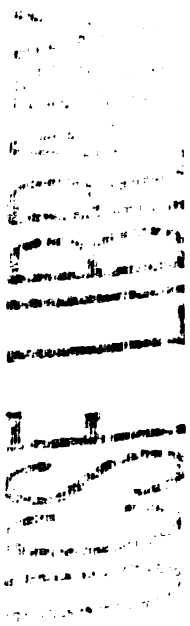
For each of the four types of tobacco (cigarettes, cigars, pipes, smokeless tobacco), the overwhelming majority of pediatric dentists had never used. This varied from 81% who had never used cigarettes to 98% who had never used smokeless tobacco. For cigarettes, pipes, and smokeless tobacco, fewer than 2% in each group were current tobacco users. However, 9% of pediatric dentists were current cigar users. When we differentiated between those who were current daily users of cigars (0.5%) and those who were current occasional users of cigars (8.7%), we found that most pediatric dentists who used cigars, used them only occasionally.

The fact that almost one of every ten pediatric dentists smoked cigars at least occasionally is cause for concern. An article in the New England Journal of Medicine documented the

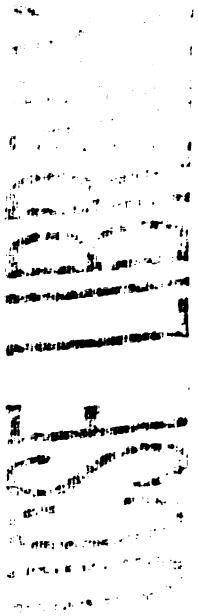


recent rise in the popularity of cigars, citing a 50% increase in cigar sales between 1993 and 1998, corresponding to an increase in cigar advertisements. In addition, many of the new cigar smokers are well-educated individuals, including pediatric dentists. (•Satcher, 1999) There have been some indications in the popular press, however, that the cigar trend is on the decline. (•Lacitis, 1999; •Brezosky, 1999) Cigars are obviously not a safe alternative to cigarette use; nor are they without potential harm to the user's health. Cigar smoke can cause oral, esophageal, laryngeal, and lung cancer. (•Satcher, 1999) Regular cigar smokers who inhale, and particularly those who smoke several cigars per day, have an increased risk of both coronary heart disease and chronic obstructive lung disease. (•Satcher, 1999)

Physicians and dentists have been reported to have the lowest rate of tobacco use of any adult group in society. (•Solberg, 1990) Several studies of dentists report that about 9% smoke. (•Fried, 1992; •Secker-Walker, 1987) It has also been reported that approximately 37% of dentists are former smokers, and 54% never smoked. (•Secker-Walker, 1987) In our study, just under 2% of pediatric dentists smoked, and only 17% were former smokers. The decreased level of current and former smoking reported in our study could be due to an actual decline in smoking rates among all dentists, or it could be that fewer pediatric dentists smoke, compared to general dentists. Smokers may have been less likely to respond to our survey than nonsmokers; however they may have also been less likely to respond to the previously cited surveys.



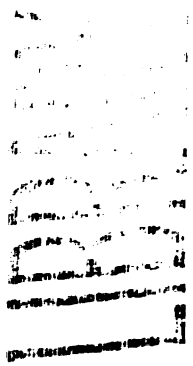
Dentists and dental hygienists who smoke have been reported to have less proactive cessation attitudes compared to nonsmokers. (•Fried, 1992; •Fried, Attitudes, 1990; •Secker-Walker, 1989) Both dentists and hygienists who use tobacco have been reported to be less likely to be involved in tobacco use cessation: dentists who were current or occasional tobacco users advised patients who used tobacco to quit less often than did dentists who did not use tobacco. (•Dolan, 1997; • Chestnutt, 1995) Hygienists were also less likely to engage in selected cessation behaviors or interventions. (•Fried, Attitudes, 1990; •Secker-Walker,1987) Similarly, physicians who smoke have been reported to be less likely to advise patients to stop smoking compared to physicians who do not smoke. (•Cummings, 1987) In contrast, our logistic regression results indicate that current tobacco use is predictive of an *increased* likelihood of assisting adolescent tobacco users with quitting, compared to those who do not use tobacco. Tobacco use was not predictive, however, of asking or advising. Our chi-square analysis found very small differences among pediatric dentists who were current, former, or 'never' users in terms of asking, advising, and assisting patients. When we compared current tobacco users to all other pediatric dentists, we found that current users were slightly less likely to ask or to assist, but were equally as likely to advise users to quit. When we compared those who had never used tobacco to all other pediatric dentists, we found that those who had never used tobacco were slightly more likely to ask and to assist, while current + former users were slightly more likely to advise users to quit.

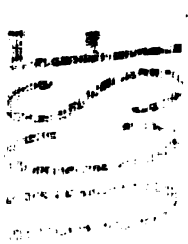


Practice Characteristics of Responding Pediatric Dentists

In future surveys, each question should be individually numbered. We found that the second part of a two-part question was often overlooked by respondents. For example, while question 5a (Setting of Practice) had a total of 815 respondents, question 5b (Type of Practice) had only 440 respondents.

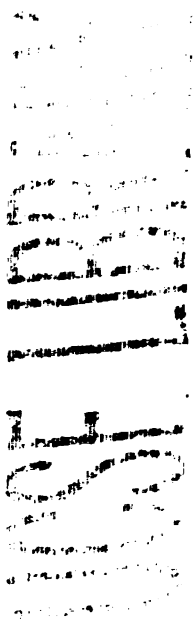
There was great variation in the number of total patients, and adolescent patients, seen per day by pediatric dentists. The mean number of total patients seen per day was 34, and the mean number of adolescent patients was 11. On average, 32% of the total number of patients seen per day were adolescents. The daily number of patients seen directly affects how busy pediatric dentists are, and therefore potentially affects the amount of time they have to provide tobacco use prevention and cessation services to their patients. In addition, pediatric dentists who see adolescents more frequently may be comparatively more familiar with treating them than those who see fewer adolescents, and could be expected to be more involved in tobacco use prevention and cessation than those pediatric dentists whose practices cater primarily to very young children. In fact, we received numerous comments from pediatric dentists who felt that tobacco use was not an issue in their office because they so rarely saw adolescents. These comments were typical, "My practice is a young practice and I don't have many adolescents; therefore I have not yet addressed this issue...". "My practice is made up primarily of younger children under age 12. I do not believe that I see that many tobacco users - I could be wrong....".





Fewer than 2% of the responding pediatric dentists allowed any tobacco use in the office. A study by Dolan published in 1997 found that 91% of practices surveyed had a policy banning tobacco use anywhere in the office by staff members, and 97% banned use by patients. (•Dolan, 1997) The banning of tobacco use in the workplace has been shown to be an effective way to reinforce the fact that the majority of society is tobacco-free, and to decrease tobacco consumption. In fact, a study in California found that employees in smoke-free workplaces had lower smoking prevalence and, among smokers, lower cigarette consumption than individuals working where smoking was permitted. (•Woodruff, 1993) Pediatric dentists appear to ban office tobacco use at higher rates compared to general dentists, and this ban contributes to the image presented to patients that tobacco use is outside of mainstream behavior. In addition, the almost complete ban of staff tobacco use in the offices of responding pediatric dentists may decrease tobacco consumption by staff who use tobacco.

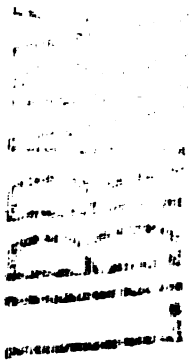
In 13% of the offices, no single individual was responsible for asking about tobacco use. Although these respondents differentiated themselves from the 17% of offices where tobacco use was not asked about at all, offices where no one is designated to ask nevertheless run the risk of failing to ask because no single individual is responsible. Added together, 30% of pediatric dentists either did not ask, or did not have one or more individuals responsible for asking. This could mean that 30% of all adolescents being seen by pediatric dentists were not being asked about tobacco use. More pediatric dentists may be encouraged to ask about tobacco use after receiving training in tobacco use prevention and cessation, because training would make them more aware of the need

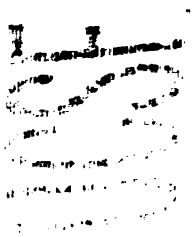


to ask, and would provide them with the education to advise and assist patients with cessation.

Tobacco Use Prevention and Cessation Habits of Responding Pediatric Dentists

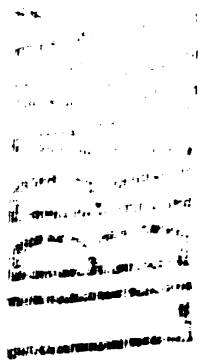
The Agency for Health Care Quality (AHCQ) (formerly the Agency for Health Care Policy and Research (AHCPR)) guidelines state that patient charts should indicate the tobacco use status of the patient and parents or caretakers, and should clearly reflect that tobacco has been discussed. (•US DHHS, 1996) It is recommended that a system be implemented that 'tags' patient charts with a sticker or symbol as either tobacco user or nonuser. (•Cohen, 1990) A simple system to tag charts and remind health professionals about counseling may help to eliminate the barriers of lack of time and forgetfulness. (•Cohen, 1987) Systems which consistently identify a patient's smoking status during office visits have been shown to play an important role in increasing the number of smokers advised to stop smoking. (•Cohen, 1987) Unfortunately, most health professionals do not appear to be documenting their patients' tobacco use status, or their own tobacco use cessation activities, in their patients' records. In a study by Secker-Walker et al. (1994), dentists and dental hygienists documented patient tobacco use status between none and some of the time, and just 31% of dentists reported having a routine system in place for identifying smokers by glancing at the chart. (•Secker-Walker, 1994) A more recent survey of U.S. dentists and hygienists found that about half of all dentists reported that they always documented the patient's tobacco use status in the dental chart. (•Dolan, 1997)

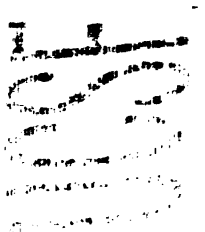




Almost three-quarters of the responding pediatric dentists in our survey did ask at least one percent of their patients about cigarette use in the three months prior to completing the survey. The implication is that cigarette use is on the minds of approximately three-quarters of all pediatric dentists. The small percent of pediatric dentists who *regularly* asked about smoking indicates that perhaps pediatric dentists asked only those adolescents about whom they were suspicious, rather than asking all adolescents uniformly. It is notable that in the three months prior to answering the survey, over one-quarter of all pediatric dentists asked *none* of their adolescent patients about smoking. There are two possible reasons: one, they suspected no cigarette use among the adolescents they saw during those three months, or two, they do not ask at all about cigarette use.

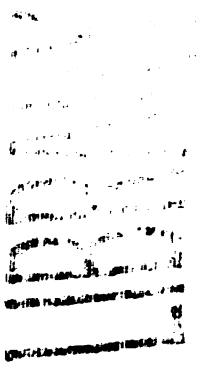
Pediatric dentists were less likely to have asked about smokeless tobacco use than cigarette use in the three months prior to completing the survey. A surprisingly large percentage (45%) had asked *none* of their adolescent patients about smokeless tobacco use. As with cigarette use, there are two possible reasons for this: one, they did not suspect smokeless tobacco use among the adolescents they saw, or two, they simply do not ask about smokeless tobacco use. Because health care providers, including pediatric dentists, may not suspect cigarette or smokeless tobacco use even among adolescents who use these products, it would be prudent for pediatric dentists to make it a habit to inquire among all adolescents about tobacco use. This sends the message to all adolescents, whether they use tobacco or not, that tobacco use is a concern to their pediatric dentist.

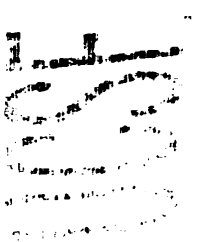




Over one-fifth of all pediatric dentists surveyed (22%) did not have any patients who reported smoking in the three months prior to completing the survey. Nine out of ten pediatric dentists who had at least one patient who reported smoking advised at least one percent of these patients to stop, and 75% advised between 91% and 100%. This is very encouraging, because it means that pediatric dentists have already met this aspect of the U.S. Department of Health and Human Services year 2000 health objectives. It also means that 90% of the pediatric dentists surveyed were at least minimally involved in tobacco cessation for their patients who smoked. It is nevertheless alarming that 10% of the responding pediatric dentists did not advise their patients who reported smoking to stop. Our goal should be that 100% of all pediatric dentists advise smokers to stop. This is a minimal intervention which should require no more than a few seconds of the practitioner's time. It does not require that the practitioner become more involved in the patient's cessation.

Over one-third (36%) of all pediatric dentists surveyed did not have any patients who reported smokeless tobacco use in the three months prior to completing the survey. More than eight out of ten (87%) pediatric dentists who had at least one patient who reported smokeless tobacco use advised at least one percent of these patients to stop. As with smoking, the majority (77%) of those who advised smokeless tobacco users to quit did so for between 91% and 100% of their patients who used smokeless tobacco. This is very promising, because, once more, it means that pediatric dentists have met this aspect of the U.S. Department of Health and Human Services year 2000 health objectives. It is even more promising that 87% of the pediatric dentists surveyed are at least minimally



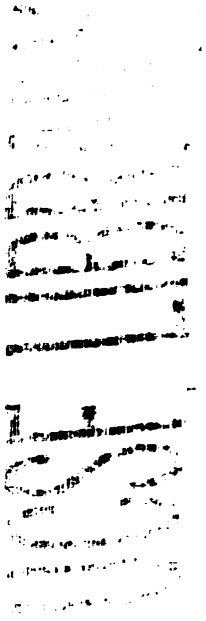


involved in tobacco cessation for their patients who use smokeless tobacco. Still, it is alarming that 13% of the pediatric dentists with patients who reported smokeless tobacco use did not advise those patients to stop. As with advice to stop smoking, our goal should be that 100% of all pediatric dentists advise smokeless tobacco users to stop.

It is interesting to note the large percentage of pediatric dentists who had patients in their practices who reported smoking (78%) or smokeless tobacco use (64%). This is a clear indication that tobacco use prevention and cessation could aid many patients of pediatric dentists, and that patients should be informed about the hazards of both smoking and smokeless tobacco use.

Respondents' Feelings of Preparation to Provide Tobacco Prevention and Cessation Services

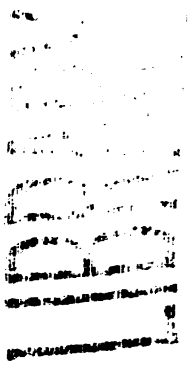
Roughly two-thirds of pediatric dentists felt either very well prepared or well prepared to ask adolescents about tobacco use, and to advise adolescent users to quit. However, that percentage dropped dramatically when pediatric dentists were asked if they felt prepared to assist adolescent users with the quitting process. Fewer than one-fifth felt either very well prepared or well prepared to assist. Almost half felt minimally prepared to assist, and over one-third felt unprepared. If pediatric dentists are interested in becoming more involved in tobacco use cessation, they will require further training.

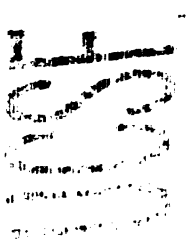


Asking, Advising, and Assisting Adolescents

In our study, the percent of pediatric dentists who regularly (always or often) asked about tobacco use was slightly less than that reported for other dental professionals. Our study found that 24% of pediatric dentists regularly asked about tobacco use. Other studies have found that between 29% and 71% of dentists regularly asked about tobacco use. (•Dolan, 1997; •Hastreiter, 1994; •Jones, 1993; •Logan, 1992) For example, a survey of Minnesota dentists (including specialists; 84% were general dentists) found that 55% of dentists asked about smoking, and 48% asked about smokeless tobacco use. (•Hastreiter, 1994) A survey of general dentists in 11 states found that 51% asked new patients about smoking, and 29% asked recall patients. (•Jones, 1993) A survey of dentists (including specialists; 85% were general dentists) practicing in Iowa found that 44% asked new patients about tobacco use. (•Logan, 1992) Another study of U.S. dental professionals found that 71% of periodontists and 33% of general dentists asked most patients about smoking. (•Dolan, 1997) The only published paper surveying pediatric dentists reported that just 2% of pediatric dentists asked most patients about smoking. (•Dolan, 1997) The discrepancy between their findings and our findings might be explained by the fact that the previous study did not differentiate between adolescent and younger patients being served.

Probably the low percentage of pediatric dentists asking about tobacco use reflects the small fraction of adolescent patients seen in pediatric dental practices. In our survey, just under one third (31.6%) of all patients seen were adolescent patients, and 24% of responding pediatric dentists reported that they always or often asked their adolescent

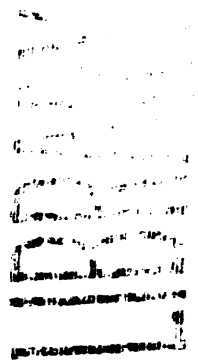


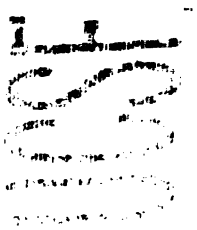


patients if they use tobacco. This percentage appears to reflect pediatric dentists' minimal involvement in asking about tobacco use, when compared to other dental professionals. To save time, pediatric dentists may ask only patients about whom they are suspicious, which may allow some adolescent tobacco users to 'slip through the cracks'.

Lack of time has consistently been identified as a major barrier to the delivery of tobacco prevention services, (•Burntett, 1999; •Chestnutt, 1995; •Severson, Dental Office, 1990; •Ockene, 1987; •Cummings, 1987; •Orleans, 1985; •Rosen, 1984) and in our survey, almost half of the respondents identified lack of time as a barrier (somewhat of a barrier or a strong barrier). Similarly, the feeling that most adolescent patients do not use tobacco was identified by almost half of the respondents as a barrier. Pediatric dentists may resist asking about tobacco use because of the feeling that the majority of their adolescent patients do not use tobacco. A sample comment from a pediatric dentist, which reflects the concern that tobacco use is not a problem in pediatric dental offices, is, "I don't feel as if I have very many adolescent patients who use tobacco; and therefore the issue does not arise often in my practice." Despite such comments, 65% of responding pediatric dentists agreed with the statement that, "It is important for a pediatric dentist to ask adolescent patients about tobacco use."

The percent of pediatric dentists reporting in our survey that they routinely (always or often) advised patients to quit was higher than many other reports in the literature. However, reports in the literature vary greatly, from 17% in a study of San Francisco dentists (•Gerbert, 1989) to 75% who advised smokeless tobacco users to quit in a recent



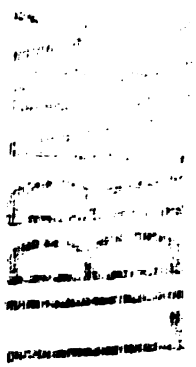


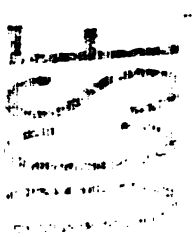
U.S. study. (•Dolan, 1997) The only previously published data on pediatric dentists reported that almost 80% advised most or nearly all known users to quit. (•Dolan, 1997) Nonetheless, the fact that over 70% of pediatric dentists responding to our survey routinely advised known users to quit shows that pediatric dentists were highly involved in one of the first stages of tobacco cessation. Moreover, 54% of pediatric dentists agreed with the statement that, "It is a pediatric dentist's responsibility to convince patients who use tobacco to stop."

The 71.4% of pediatric dentists who routinely advised known users to quit falls just short of the goal stated by the U.S. Department of Health and Human Services in their year 2000 health objectives, which is to increase to at least 75% the proportion of oral health care providers who routinely advise cessation. (•Healthy People 2000, 1990) However, if we look at the percentage of pediatric dentists who at least sometimes advised cessation, we see that over 80% were involved.

Perhaps participation in our survey will influence some pediatric dentists to become more involved in tobacco cessation. Numerous comments, summarized by the following statement from a responding pediatric dentist, suggest this intention: "This survey makes me realize how important influencing our young patients to cessate tobacco. [sic] I am starting today to ask about tobacco. Thank you."

Just under one-quarter of pediatric dentists routinely (always or often) assisted known users with the quitting process. This finding was similar to other reports in the literature.



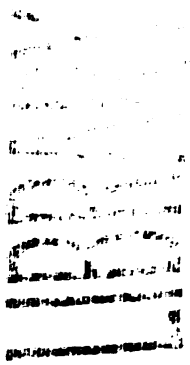


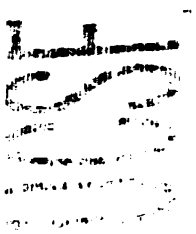
(•Dolan, 1997; •Hastreiter, 1994; •Jones, 1993; •Logan, 1992) This number was significantly less than the goal of 75%, as stated in the Healthy People 2000 objectives. (•Healthy People 2000, 1990) One could conclude from our data that pediatric dentists were involved in tobacco use cessation up to a point: while they advised users to quit, they were unlikely to assist users with quitting. One explanation for their lack of involvement with assisting may be that they felt unprepared to do so. Interventions are needed to address this void. In fact, more than 70% of responding pediatric dentists indicated a desire for training in tobacco use prevention and cessation, and 55% agreed that, "It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this."

Pediatric Dentists' Feelings About Tobacco Control Activities

It is interesting to consider that over 90% of respondents felt that pediatric dentists should not use tobacco, and almost 90% of respondents did not use tobacco. Our results agreed with previous studies which reported that between 88% and 92% of dentists, and 85% of dental hygiene students, believed they should set a good example by not smoking. (•O'Shea, 1992; •MMWR, 1985; •Christen, 1984)

It is not unexpected to note that the percent of pediatric dentists who agreed that pediatric dentists should ask adolescent patients about tobacco use was higher than the percent of pediatric dentists who did routinely ask (65% vs. 24%). Hopefully, those pediatric dentists who felt they should be asking, but were not, will be motivated by this survey to begin asking about tobacco use. Analogously, while over 75% of pediatric dentists

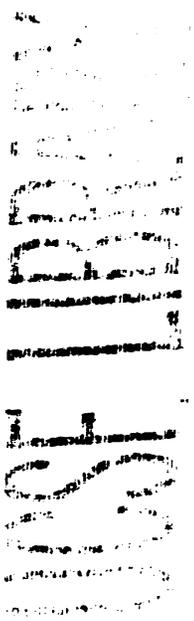




agreed that pediatric dentists should encourage adolescent non-users to remain tobacco free, a much smaller proportion, 32%, actually did so on a regular basis. Likewise, while over half of the pediatric dentists surveyed felt that it is a pediatric dentist's responsibility to help patients who wish to stop using tobacco accomplish this, less than a quarter actually assisted their patients. Previous studies have reported that 88% of dentists (•Christen, 1984) and 74% of dental hygiene students (•O'Shea, 1992) agreed that it is their responsibility to help patients who wish to stop using tobacco accomplish this. The percentages we report probably would increase as a result of educational interventions to prepare pediatric dentists to engage in these activities.

In the opposite manner, pediatric dentists were actually more likely to advise their adolescent patients who used tobacco to quit than they were to agree that it is their responsibility to do so. While pediatric dentists may not feel, in a broad sense, that it is their responsibility to convince patients to quit, on a one-on-one basis in the dental office, they appear to be quite active in advising individual users to quit. Previous studies found that between 61% (•MMWR, 1985) and 65% (•Christen, 1984) of dentists, and 85% of dental hygiene students (•O'Shea, 1992) agreed that they should convince patients to stop smoking.

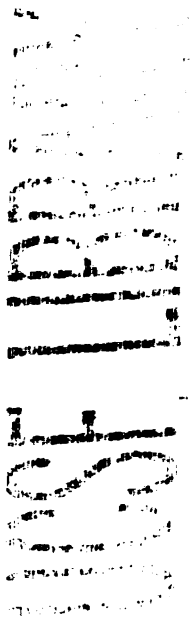
It is remarkable that pediatric dentists participate in tobacco prevention and cessation to the extent that they do, because six of every ten agreed with the statement that, "Most adolescents will not give up tobacco use even if their pediatric dentist tells them to." Pediatric dentists appear to realize the significance of tobacco prevention and cessation



efforts, and feel that it is worth their time and effort to get through to even a small percentage of the patients they counsel about tobacco use. This statement is supported by the small percentage of those agreeing that a pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients: just one in five agreed with this statement. The literature supports the idea that dentists who believe that they can impact the tobacco use habits of their patients are more likely to play an active role in tobacco cessation counseling for their patients. Dentists who agreed that they can encourage patients to stop using tobacco were significantly more likely to both ask their patients about tobacco use and advise users to quit. (•Telivuo, 1991)

Pediatric dentists also appear to be aware that nicotine is as addictive for adolescents as it is for adults: over half agreed that adolescents become addicted to nicotine.

Forty-two percent of pediatric dentists agreed that pediatric dentists should be more active in speaking before lay groups about tobacco use. This represents a commitment to tobacco prevention and cessation beyond the scope of the practice, and indicates that many pediatric dentists are willing to become involved in community tobacco cessation efforts. This survey reflects the feeling that pediatric dentists have an obligation in the area of oral health, and that oral health includes tobacco use. However, the pediatric dentists responding to our survey were less likely than dentists in previous reports to agree that they should be more active in speaking to lay groups about tobacco use. Other studies have reported that between 68% (•MMWR, 1985) and 86% (•Christen, 1984) of dentists held this belief. The literature supports the idea that dentists who believe that

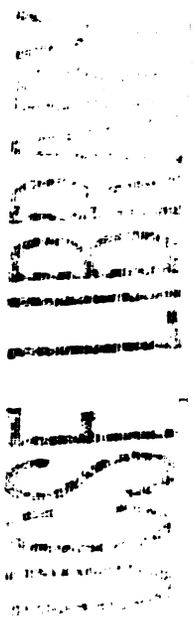


they should take part in anti-tobacco health education are more likely to play an active role in tobacco cessation counseling for their patients. Dentists who agreed that they should be actively involved in anti-tobacco health education were significantly more likely to both ask their patients about tobacco use and to advise users to quit. (•Telivuo, 1991)

Knowledge Questions

Overall, pediatric dentists appear to be unaware of the extent to which adolescents use tobacco, and of the emerging problem of tobacco use in this population. Increasing their education about the problem of adolescent tobacco use may provide initial motivation for pediatric dentists to engage in tobacco control activities.

Respondents' answers to the knowledge questions were related to the likelihood that they asked, advised, and assisted. Those who never asked, advised, or assisted were more likely to have answered all four questions incorrectly. For example, 37% of pediatric dentists who never asked about tobacco use answered all of the questions incorrectly, compared to 15% who always asked. A similar pattern was true for assisting, where 34% of those who never assisted answered all of the questions incorrectly, compared to 24% who always assisted. A significantly greater percent of pediatric dentists who never advised answered all of the questions incorrectly (40%), compared to those who always advised (25%). To increase the percentage of pediatric dentists who ask, advise, and assist, we should provide pediatric dentists with more information about adolescent

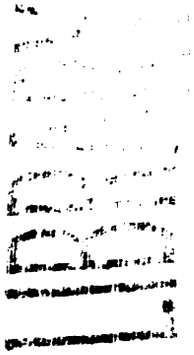


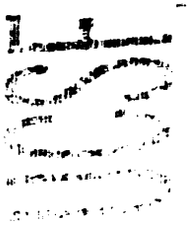
tobacco use. This may alert them to the need to become involved in preventing and stopping adolescent tobacco use.

Barriers to Helping Adolescent Patients Stop Tobacco Use

Our hypothesis was that lack of time would be the major barrier identified by at least 75% of respondents. Contrary to what we had anticipated, only 47% identified lack of time as a barrier. This finding is consistent with the 38% to 50% reported in the literature for other dental professionals. (•Chestnutt 1995; •Hastreiter, 1994; •Severson, Dental Office, 1990) Although no barrier was identified by at least 75% of respondents, 70% did identify the feeling that patients would be resistant to cessation services as a barrier to helping their adolescent patients stop tobacco use. This perception is contrary to findings reported in the literature that most adolescents who smoke want to quit. (•Lynch, p.74, 1994; •US DHHS, 1994) Educating pediatric dentists to this notion may be helpful in overcoming this barrier to helping adolescent patients stop tobacco use. Patient resistance has been described as a barrier in other studies, with varying frequencies. In a 1990 study, 56% of dentists felt patient resistance was a barrier (•Severson, Dental Office, 1990). In a 1994 study, 35% of dentists indicated that this was a barrier. (•Hastreiter, 1994) In 1999 Campbell reported that 94% of dental professionals surveyed felt that patient resistance to cessation services was a barrier. (•Campbell, 1999)

Because lack of resources is a fairly easy barrier to remedy, it was encouraging to note that not knowing where to send patients for counseling and not having materials to hand out were cited twice among the top four barriers. There are multiple resources available

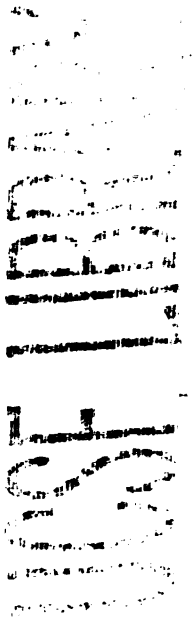




to pediatric dentists to help them help their patients stop tobacco use, including the National Cancer Institute, which provides summary information about further resources. (See Appendix C for further details.) Interventions to make pediatric dentists aware of the multiple resources available to them to help their patients stop tobacco use are needed. Moreover, the literature supports the idea that with formal tobacco cessation training, health care providers are more likely to be able to obtain adequate resources for their patients, including adequate referral resources and patient education materials.

It is interesting to note that almost half (45%) of the respondents felt that their adolescent patients did not use tobacco, in light of the fact that 78% reported having patients who smoked, and 64% reported having patients who used smokeless tobacco, in the 3 months prior to completing the survey. Studies report that more than one-third of high-school aged adolescents smoke at least once a month, and over 16% are frequent smokers. (•Kann, 1998) Clearly, pediatric dentists, by their own report, see patients who use tobacco, yet they appear as a group to believe that a much smaller percent of their patients use tobacco than actually do.

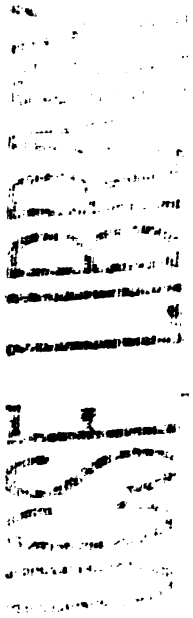
One limitation to our findings on barriers is that we did not include 'lack of training' as a potential barrier. However, we did include two barriers that are directly related to training: one is a feeling of ineffectiveness, and the other is not knowing what to say. Over 60% of respondents cited as a barrier the feeling that they could not effectively help patients quit using tobacco. It is reasonable to speculate that a feeling of ineffectiveness could be related to a lack of training, and the literature supports this relationship.



(•Zapka, 1999) Likewise, not knowing what to say, identified by 36% of pediatric dentists in our survey as a barrier, can be addressed through training. Many studies have documented that health care providers with training know how to provide cessation services, (i.e. they 'know what to say'). (•Dolan, 1997; •Fried, Oral Health, 1992; •Severson, Dental Office, 1990) Also, their training makes them aware of the need for tobacco cessation services. In our survey, over 35% of pediatric dentists agreed that it just had not occurred to them to provide tobacco cessation services. Appropriate tobacco use prevention and cessation training would help to alleviate these barriers.

One-third of our respondents identified lack of adequate reimbursement as a barrier. Previous studies have reported lack of adequate reimbursement to be a barrier for between 39% and 45% of respondents. (•Dolan, 1997; Hastreiter, 1994) The American Dental Association has an insurance code for reimbursement of tobacco cessation services, but many individual insurance contracts are restrictive as to what they will cover for tobacco prevention and cessation. Dentists and insurance providers need to discuss the issue of reimbursement.

An interesting note is that almost 30% of pediatric dentists have been unsuccessful in providing tobacco cessation services in the past. Since only 47% of pediatric dentists have ever assisted patients with quitting, quite a large percentage of pediatric dentists who have attempted to assist have been unsuccessful. Again, training would help to address this problem.

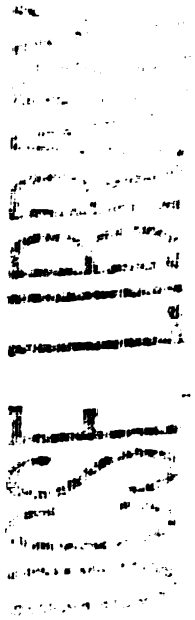


It is heartening to see that the barrier chosen least often by respondents was 'don't feel this is appropriate for a pediatric dentist'. Almost 75% of respondents did not feel that this was a barrier. This leads to the assumption that almost 75% of pediatric dentists feel that tobacco cessation services are appropriate for pediatric dental offices. Although there is no comparable literature in pediatric dentistry, one study found that almost 60% of patients in a general dental office expected their dental office to provide tobacco use cessation services. (•Campbell, 1999) Appropriate tobacco use prevention and cessation training would help to alleviate all of the above barriers.

A limitation to Table 9 is that we assumed that missing data was part of 'not a barrier' response. This may cause us to underestimate the percent of pediatric dentists who feel that one of the barriers is an impediment to the implementation of tobacco interventions.

Association Between Performance of Tobacco Control Behaviors and Perception of Preparation

We hypothesized that feeling minimally or unprepared to ask, advise, or assist would be negatively associated with the implementation of the respective practice, and this is what we found. An interesting note is that while a feeling of preparedness to ask, advise, and assist was associated with actually asking, advising, and assisting, respectively, the strongest association was between feeling prepared to assist and assisting, and the weakest association was between feeling prepared to advise and advising. One explanation for this finding is that a great number of pediatric dentists advised their



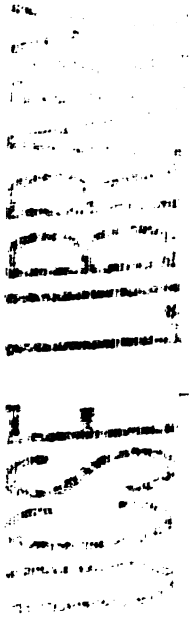
patients to quit, whether or not they felt prepared to do so. Therefore, preparation had less of an impact.

Although there was an association between perception of preparation to perform a certain behavior and actual performance of that behavior, this does not indicate a cause and effect.

Association Between Performance of Tobacco Control Behaviors and Perception of Importance

Because of the great number of pediatric dentists who advised their patients to quit, whether or not they felt that advising was important, the association between advising and perception of the importance of advising was the weakest of the three behaviors (asking, advising, and assisting). Almost 65% of those who felt that advising was unimportant nevertheless advised their patients to quit. Therefore, there was less disparity between the percentages who did and did not advise, and feelings of importance had less of an impact. An explanation for this finding is that perhaps pediatric dentists felt that advising was relatively unimportant compared to other activities performed in their practices. Respondent may have compared advising to other, more immediate, demands for care.

Interestingly, more pediatric dentists advised their patients to quit using tobacco than asked their patients about tobacco use. Although responding pediatric dentists might not have asked all or even most of their adolescent patients about tobacco use, when they did

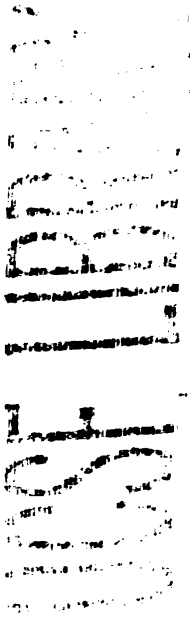


encounter a known adolescent tobacco user, they were highly likely to advise that patient to quit.

Willingness to Provide Tobacco Prevention and Cessation Services

In Hypothesis 3a, we hypothesized that at least 75% of respondents who did not already ask about tobacco use, encourage non-users to remain tobacco free, or provide materials for non-users, would indicate a willingness to provide the respective service to their adolescent patients. Our hypothesis was supported. Over 80% of respondents were willing to provide each service. This level of willingness is notable because it comes from a group of pediatric dentists who were not active in tobacco prevention or cessation.

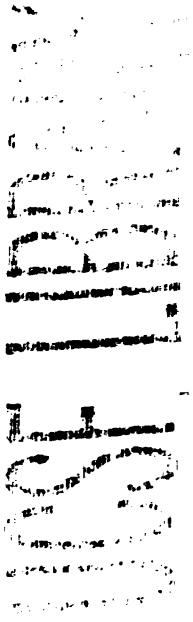
Hypothesis 3b was partially supported by our results. We hypothesized that at least 75% of respondents who did not already advise users to quit, provide materials, refer, discuss quitting strategies, encourage patients to set a quit date, and provide follow-up, would indicate a willingness to provide the respective service to their adolescent tobacco users. We found that almost 90% were willing to advise known users to quit, and that more pediatric dentists who do not currently participate in tobacco use prevention or cessation indicated a willingness to provide this service than any other. This response reflects an understanding of the obligation that pediatric dentists have both to maintain the oral health of their patients, and in a broader sense, to provide guidance on health issues that are peripherally related to dentistry.



In addition, more than 75% of respondents were willing to provide materials and refer to cessation programs. However, fewer than 75% were willing to discuss specific strategies for quitting, encourage patients to set a quit date, or provide follow-up for patients trying to quit.

The line between what at least 75% of pediatric dentists were willing versus unwilling to do appears to be defined by level of participation. That is, a pediatric dentist who wished to help an adolescent patient quit tobacco use, but wished to be minimally involved, could easily provide that patient with literature, including information about local cessation programs. However, discussing strategies and quit dates, and providing follow-up, imply both greater involvement by the pediatric dentist and greater knowledge of tobacco cessation techniques. Pediatric dentists may not be willing to participate in actual cessation because they were not trained to do so. Just 11.8% of all respondents had training in tobacco use cessation. Additionally, only a small portion of those with training answered this question because many were already providing these services some of the time.

In Hypothesis 3c, we hypothesized that fewer than 75% of respondents who did not already recommend nicotine gum or patches would indicate a willingness to provide the respective service to their adolescent tobacco users, and our hypothesis was supported. Just over half of the non-participating pediatric dentists were willing to recommend either nicotine gum or the nicotine patch. It is not surprising that recommendation of nicotine replacement therapy was the service in which currently non-participating pediatric

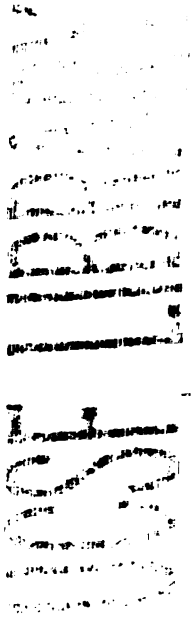


dentists were least willing to participate, because it was also the service that the fewest pediatric dentists (6%) provided. This lack of willingness to provide nicotine replacement therapy may be due to a lack of preparedness, as indicated by the fact that 83% of respondents felt minimally prepared or unprepared to assist with the cessation process.

Willingness To Receive Training

In accordance with Hypothesis 3d, we found that fewer than 75% of respondents with no previous tobacco use prevention or cessation training indicated a willingness to receive such training. It is nonetheless encouraging to note that 70% were willing to receive training. Our chi-square analysis found that pediatric dentists who were willing to receive training were more likely to be involved in each aspect of tobacco use prevention and cessation (asking, advising, and assisting). In addition, we found that pediatric dentists with training are more likely than those without to ask, advise, and assist. It is therefore essential to increase the limited number of currently available continuing education courses on tobacco use prevention and cessation, and to implement tobacco use prevention and cessation training in dental schools and pediatric dental residency training programs.

There was an association between willingness to be trained and feeling prepared to ask adolescent patients about tobacco use, advise users to quit, and assist users with quitting. The association, however, was not as expected. We found that those who felt minimally prepared were significantly more likely to indicate a willingness to be trained than those

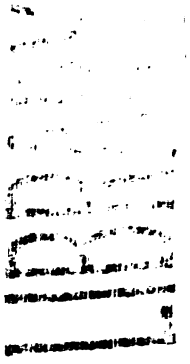


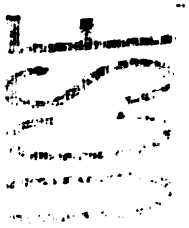
who felt very well prepared, well prepared, and unprepared. Perhaps those who felt very well or well prepared felt that they did not need training, and those who felt unprepared were not interested in incorporating tobacco use prevention and cessation into their offices. This is only conjecture, however, and needs to be substantiated by further research.

In addition, those dentists who appeared to have a more positive attitude about tobacco prevention or cessation were more willing to be trained. For example, those who strongly agreed or agreed with the ideas that it is a pediatric dentist's responsibility to convince patients who use tobacco to stop, and to help patients who wish to stop, were more willing to receive training than those who strongly disagreed, disagreed, or were neutral concerning those statements. Similarly, those who strongly agreed or agreed with the ideas that it is important for a pediatric dentist to ask adolescent patients about tobacco use, and to encourage adolescent non-users to remain tobacco free, were more willing to receive training than those who strongly disagreed, disagreed, or were neutral concerning those statements.

Predictors of Asking, Advising, and Assisting

In summary, it is interesting to note that in all 4 models, preparedness to ask was predictive of advising, and preparedness to advise was predictive of assisting. If we consider asking, advising, and assisting to be increasingly involved activities requiring more dentist training and time, it appears that a feeling of preparedness to perform a less involved activity predicted participation in the next level of activity. One might speculate





that pediatric dentists are willing to participate in tobacco use cessation at levels just slightly beyond those at which they feel prepared. Because training has been shown to increase how prepared participants feel to provide tobacco cessation, and because our survey showed that pediatric dentists with training are more likely to assist tobacco users with quitting, more training for pediatric dentists could greatly increase the quantity and quality of cessation services that patients receive.

In fact, over half of all dentists who never asked, advised, or assisted were willing to receive training. Perhaps these pediatric dentists did not participate in the respective activity because they did not feel prepared to do so. Their willingness to receive training could be taken as an indication that perhaps, with training, they would be more likely to participate in tobacco control activities.

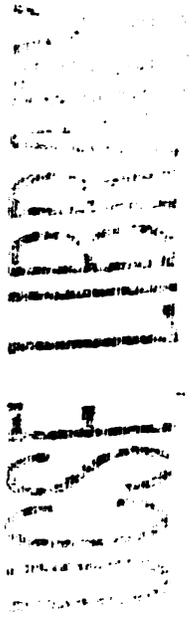
Identification of tobacco users was predictive of asking, advising, and assisting: identification predicted a 12-fold increase in asking, a 13-fold increase in advising, and a 5-fold increase in assisting. In addition, documentation of a tobacco habit in the dental chart predicted a 3-fold increase in asking, a 4-fold increase in advising, and a 2-fold increase in assisting. These results make a strong case for increasing education in the area of tobacco use prevention and cessation. If pediatric dentists are taught the importance of simple steps such as identification and documentation, and implement these practices in their offices, they will be more likely to become involved in all aspects of tobacco use prevention and cessation.

Pediatric dentists who agreed with statements advocating participation by pediatric dentists in tobacco control activities were more likely to actually provide those services for their adolescent patients, compared to those who disagreed with such statements.

Specifically, agreement with any of the following statements was predictive of asking: "A pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients" (#22c*), or "It is important for a pediatric dentist to ask adolescent patients about tobacco use" (#22j). Agreement with any of the following statements was predictive of advising: "It is a pediatric dentist's responsibility to convince patients who use tobacco to stop" (#22a) or #22j. Agreement with any of the following statements was predictive of assisting: "It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this" (#22b), or #22c* or #22j.

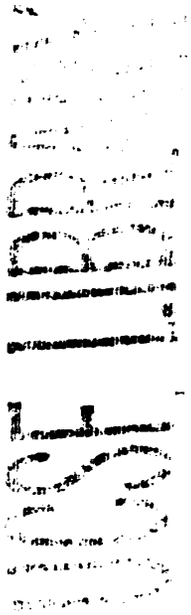
*Note: question #22c was reverse-ordered for the scale; therefore *disagreement* with this statement was predictive of asking and assisting.

The implication is that to increase the percentage of pediatric dentists who provide tobacco use prevention and cessation services, we must give pediatric dentists a reason to feel that it is their responsibility to provide such services. If tobacco use prevention and cessation services part of routine daily practice, just as cleanings and provision of oral hygiene instructions currently are, then perhaps more pediatric dentists would begin to provide tobacco use services for their patients.



In the chi-square analysis, females were twice as likely as males to ask about tobacco use, and about 1½ times as likely to advise users to quit, and to assist users with quitting. In the logistic regression analysis, female gender was predictive only of asking. It is unclear why females are more likely to be involved in tobacco use interventions. Although there are an increasing number of females entering the field of pediatric dentistry, leading to an increasingly larger percentage of younger pediatric dentists who are female, we found no relationship between year of graduation and increased likelihood of *asking, advising,* or *assisting*. In fact, the only model in which year of graduation was predictive found that more recent graduates were *less* likely to *advise* users to quit. An explanation for the differences based on gender and year of graduation requires further research.

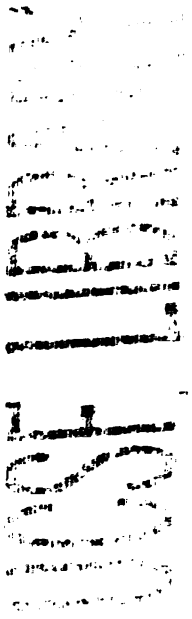
Pediatric dentists who were current tobacco users were more likely to assist users with quitting, while those who allowed staff to use tobacco in the office were less likely to assist. Perhaps pediatric dentists who use tobacco are more interested in assisting their adolescent patients with cessation because of their first-hand knowledge of tobacco's addictiveness and their desire to prevent these young people from becoming adult tobacco users like themselves. Or, perhaps pediatric dentists who use tobacco are more likely to have training in tobacco cessation because of their personal interest, and are therefore more capable of assisting users with quitting. Conversely, pediatric dentists who allow staff to use tobacco in the office are less likely to assist. A policy permitting in-office tobacco use implies either a disregard for staff and patient health, or an ignorance of the negative health effects of tobacco use. Fortunately, only 2% of the responding pediatric dentists permitted in-office staff tobacco use.



We looked into state cigarette tax with the idea that this tax might reflect the attitude of the individuals living in the state. We thought that perhaps lower cigarette taxes would indicate a more permissive statewide attitude toward tobacco use, and that, by extension, this attitude might be reflected in the practices of the pediatric dentists in that state: we expected to find that pediatric dentists who participated in tobacco control activities would come from states with higher cigarette taxes. We found, however, that cigarette taxes were not predictive in any model of asking, advising, or assisting.

However, we did find a negative correlation ($r_s = -0.43$) between a state's cigarette tax and that state's smoking prevalence. This means that states with lower cigarette taxes tended to have higher smoking prevalence. In addition, pediatric dentists in states with higher smoking prevalence were more likely to ask, advise, and assist. One could guess that pediatric dentists practicing in these states, where low cigarette taxes ease access to cigarettes, and where smoking prevalence is high, are more aware of tobacco use as a problem and are therefore more involved in tobacco prevention and cessation activities. These states with low cigarette taxes are also often tobacco-producing states, perhaps further sensitizing pediatric dentists to tobacco as a problem.

Because of the high prevalence of smokeless tobacco use among rural adolescent males, we expected pediatric dentists in rural areas to be more involved in cessation activities than those in urban or suburban areas. We found, however, that practice setting was not predictive in any model of asking, advising, or assisting.



Although practice setting was not a predictor, region of the country was: pediatric dentists living in the Pacific region were less likely to ask about tobacco use (compared to those in the Atlantic or Central regions), while those in the Central region were less likely to assist users with quitting. These differences may be linked to training: perhaps pediatric dentists receive different emphasis in their tobacco use prevention and cessation training (for example, in dental schools, residency programs, and CE courses), and this varied training translates to different amounts of involvement in tobacco use prevention and cessation. This assumes, however, that pediatric dentists receive training in the region of the country in which they practice. This regional difference requires further research, but with the information available, CE courses can be tailored to meet the needs of the pediatric dentists in specific regions of the country.

B. ROLE OF PEDIATRIC DENTISTS

Belanger and Poulson (•Belanger, 1983) presented a case in the journal *Pediatric Dentistry* in 1983 in which two brothers, ages 15 and 11, had used snuff for 6 years, beginning in the 4th grade and in kindergarten, respectively. Both estimated that they used it 10-12 hours per day. They had managed to keep their parents and teachers unaware of their use for several years. The significance of this report is the reminder that any child or adolescent in a pediatric dental office may be using tobacco. (• Waldman, 1998) What, therefore, is the role of the pediatric dentist?

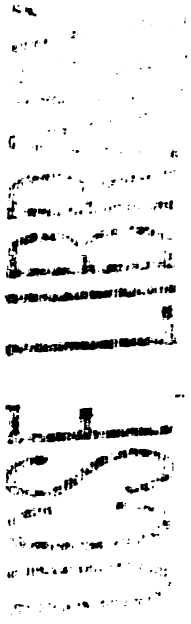
Pediatric dentists should be aware that tobacco use by patients of all ages is a potential problem, and they should understand that children from all types of families use tobacco.

Smoked and smokeless tobacco use should be asked about on health history forms, and patients' tobacco use status, as well as the findings of all oral examinations, should be recorded. Pediatric dentists should have resources available for patients, and be able to refer patients for tobacco cessation if they do not provide this service in their office.

Pediatric dentists who see either children or adolescents should be able to recognize early changes in the oral and perioral environment caused by the use of tobacco. They should be aware of the potential health hazards of tobacco use, and be able to educate patients and families about the consequences of use, both in the oral cavity and to the general health. (•Greer, 1986; •Belanger, 1983; •Greer, 1983) Belanger and Poulson state that dentists have an *obligation* to detect oral changes which may be a result of tobacco use, alert patients and parents to those changes, and make recommendations for treatment. (•Belanger, 1983)

In addition, knowledge of tobacco use demographics will allow pediatric dentists to preventively target at-risk groups. For instance, the large percentage of adolescent males who use smokeless tobacco is indicative of the need for pediatric dentists to closely monitor the male high school aged adolescents in their practices, and to take appropriate preventive actions. (• Marty, 1986)

Pediatric dentists should also understand that children of parents who smoke are at an increased risk for starting to smoke at an early age. In a study of third and fifth grade children, the risk of an early onset of cigarette use increased with exposure level to



parental smoking. The risk rates for children of former smokers indicated that even when parents quit smoking, the original risks associated with parental smoking remained. (•Waldman, 1998)

Pediatric dentists who encourage non-users to remain tobacco free should start talking about tobacco at an early age. The Agency for Health Care Quality (AHCQ) (formerly the Agency for Health Care Policy and Research (AHCPR)) recommends that the discussion of tobacco-related issues begin before the onset of adolescence, and preferably before entry into junior high school. They recommend that discussions continue throughout high school. (•US DHHS, 1996)

Pediatric dentists who wish to incorporate even a minimal smoking cessation program into their practices should have a policy of no tobacco use for patients, parents, and staff. Magazines that advertise tobacco use should not be placed in the waiting room, and should be replace with magazines which do not carry tobacco advertising. (•Sachs, 1990) Some of these magazines include *Good Housekeeping, Highlights for Children, National Geographic, The New Yorker, Parenting, Parents Magazine, Ranger Rick, Reader's Digest, Scientific American, Sesame Street, Seventeen, Smithsonian, and Sunset Magazine*. For a complete list of magazines which do not carry tobacco advertising, contact the National Institute of Health, National Cancer Institute at 1-800-4-CANCER. (•Mecklenburg, 1993)

What do dentists gain by becoming involved in tobacco use prevention and cessation? Dentists who provide tobacco use prevention or cessation services usually show concern that goes beyond the boundaries of traditional dental care. This professional regard for the patient's total state of health may increase the patient's and parent's trust, loyalty, and willingness to seek future treatment. As a result, many dental practitioners believe that smoking education and cessation programs can act as effective practice builders. (•Christen, 1994; •Mecklenburg, 1993)

Pediatric dentists come in frequent contact with adolescents, and have the opportunity to prevent adolescent tobacco use and to encourage adolescents who use tobacco to stop. This study is the first to date to identify the current practices, attitudes, and knowledge of pediatric dentists with regard to adolescent tobacco use. We hope that it will be helpful in developing interventions in which pediatric dentists could participate.

C. SUGGESTIONS FOR BECOMING INVOLVED

There are many ways that pediatric dentists can help to improve the oral health of their patients. Perhaps the most obvious way is to provide preventive and treatment services to patients on a one-to-one basis within the dental office. However, additional options for becoming involved exist, including becoming involved in community prevention programs, such as school-based education programs, communicating with other dentists, either on an individual basis or through organized dentistry, communicating with medical professionals, and communicating with government agencies to help bring about changes in targeted populations. (•Silversin, 1989)

Prevention activities are most successful when they are community based, because adolescents will change their behavior only if those changes are consistent with changes in societal norms. Smoking among adolescents remains, for the most part, socially acceptable. To be successful, interventions need to bring about changes in societal norms so that smoking is widely perceived as deviant behavior, by both adolescents and adults. (•Fiore, 1990) Successful interventions are aided by large-scale public service advertising which discredits tobacco use. An evaluation of antismoking advertising campaigns found that the most effective strategies for "denormalizing" smoking are to focus on tobacco industry manipulation, and secondhand smoke. Among young people in particular, messages about the effects of secondhand smoke are particularly effective. (•Goldman, 1998) In schools where intervention programs exist to prevent cigarette initiation and regular use, there has been a 4.5% decrease in the prevalence of regular cigarette use among youth in the programs. (•Perez-Stable, 1998) In addition, children in these programs score significantly higher on tobacco knowledge and attitude scales. (•Price, 1998)

As an example of involvement through organized dentistry, pediatric dentists might consider participation in National Children's Dental Health Month, which has taken place during the month of February for the past 40 years. During this month, the American Dental Association (ADA) encourages dentists to participate in local oral health promotions targeting children and their parents. The ADA produces a program planning guide and resource material that dentists can use to create an oral health promotion

program, including brochures, posters, press releases, sample newspaper stories, and artwork. State and local dental societies conduct contests for children, organize dental health fairs, present school-based programs for students, teachers, and parents, and construct dental health exhibits in shopping areas and libraries. (•Silversin, 1989)

Throughout the year, the ADA and the NCI will provide instructional programs and educational materials for use with patients. The ADA also provides members with resource kits on tobacco cessation and smokeless tobacco. Many other agencies also provide information about tobacco prevention and cessation. (See Appendix C for details.)

Although 85% of all smokers quit on their own, (•Fiore, 1990) health providers can greatly facilitate this process. Studies have documented that for smoking cessation, multiple interventions, given by multiple health care providers on multiple occasions have the greatest chance of success. (•Glynn, 1988)

In articles reviewing the literature, both Glynn and Kottke found that when measuring ability of health care providers to influence smokers to quit, it was more effective to consistently give patients advice to quit rather than to make single patient contacts. (•Glynn, 1990; •Kottke, 1988)

Russell's study of physicians in London concluded that the more that health care providers encourage smokers to quit, the greater number of smokers will be reached, will try to quit, and will eventually quit. (•Russell, 1979)

Repeated interventions cause behavioral changes, and move smokers from one stage of the cessation process to the next (i.e. from no interest in cessation, to consideration and short-term attempts, to a sincere desire and motivation to quit). As individuals experience increased numbers of interventions in their daily lives, more will choose to attempt to quit on their own.

It is important to note that successful interventions are not associated with new or unusual methods, but rather with repeated and personalized advice and assistance, in different forms and from different sources, over a period of time. (•Kottke, 1988)

A randomized trial of physicians found that those physicians who had help in establishing office routines for providing tobacco cessation services were more likely to provide patients with such advice, compared to physicians who had no such help. (•Dietrich, 1992) This leads to the question of whether health care providers need assistance to establish successful tobacco cessation programs in their offices.

Assistance is currently available from the National Cancer Institute (NCI), which has a training program in which members of the oral health team learn about helping patients with tobacco cessation. This program is brief and should be easy to implement into

pediatric dental practices. It involves using the "5 A's": anticipate, ask, advise, assist, and arrange.

Anticipate refers to looking at the tobacco-related risks that will need to be addressed during a child's development. Patients are then *asked* about their tobacco use habits, *advised* against tobacco use, *assisted* in the cessation process, and resources and support are *arranged* to help ensure long-term abstinence. (•Mecklenburg, 1993)
It has been recommended that children should be asked about experimentation with tobacco beginning at age 8. (•Perez-Stable, 1998)
When all five A's are used together routinely, clinical studies show a higher quit rate than if only two or three A's are used. (•Mecklenburg, 1993) A sustained, one-year quit rate of 5-10% can be expected when utilizing all five "A's". This is 17 times greater than the success rate with no intervention. (•Barker, 1995; •Sachs, 1990)

Although infrequently provided by health professionals, assistance in the form of getting patients to set a quit date is a simple and effective technique to help patients quit. (•Ockene, 1987) Other forms of assistance that have been shown to be effective in aiding patients with tobacco cessation are providing printed self-help materials about smoking cessation, (•Russell, 1979) and recommending nicotine replacement therapy (nicotine gum or nicotine transdermal patches). (•Christen, 1984; •Russell, 1983)

Nicotine replacement therapy should only be considered for use with children or adolescents when there is evidence of nicotine dependence and the child has a clear desire

to quit tobacco use. (•US DHHS, 1996) In adults, nicotine replacement has been found to be a very effective method of assisting patients with the quitting process: one study documented a 38.5% quit rate after 3 years. (•Cooper, 1990)

The fourth "A", arranging for follow-up visits and further assistance, has also been shown to be effective in tobacco use cessation, (•Mecklenburg, 1989; •Ockene, 1987) although one study found no evidence for the effectiveness of long term follow-up visits. (•Gilbert, 1992)

Another program aiding the oral health team in helping their patients quit tobacco use is promoted by Indiana University. Their eight-step quit-smoking program is meant to be implemented in dental offices, and follows many of the NCI's strategies. (•Christen, 1990; Guba, 1990) Following are some elements of the program: Select a coordinator for smoking cessation in the office. Create a nonsmoking office environment by encouraging all staff members not to use tobacco, posting signs declaring the office to be tobacco free, and displaying literature about the health benefits of a tobacco-free lifestyle. Provide tobacco cessation materials, such as pamphlets, booklets, and videotapes, in the waiting area. Identify all patients in the practice who smoke, and note and update smoking status on patient charts. Lastly, use the "five A's": anticipate, ask, advise, assist, and arrange. (•Crews, 1994; •Christen, 1990)

Some practitioners recommend charging patients a fee for dental office tobacco cessation therapy. They reason that this treatment is of significant benefit to the patient's oral

health, as well as to their general health. The fee can be determined by the amount of time spent on the treatment: asking and advising should take 1 to 2 minutes, assisting may take 10 to 15 minutes, and arranging for follow-up should take about 5 to 10 minutes.

The ADA insurance code for tobacco cessation therapy is 01320, and is titled 'Tobacco counseling for the control and prevention of oral disease.' There is no limitation placed by the ADA on either the age of the patient being treated, or the number of times the code can be used. However, individual insurance contracts may have more restrictions. More information can be found in the ADA's Current Dental Terminology manual, 3rd Edition, (released in January 2000) or by calling the ADA at (312) 440-2500. (•ADA CDT-2)

In summary, the results of this study indicate that although pediatric dentists are not universally involved in tobacco use prevention or cessation, when they have adolescents in their practices who use tobacco, they are likely to advise cessation. Pediatric dentists are less involved in assisting users with quitting, however. These results indicate that pediatric dentists are in need of intervention to train them in tobacco cessation techniques, and are interested in obtaining such information.

D. LIMITATIONS

It should be noted that the data available from this survey are based on self-report. There is some evidence to indicate that health professionals tend to overestimate their actual performance when they report on their own counseling and other clinical activities. (•McPhee, 1986) We should therefore be cautious about taking these self-reported

estimates at their face value. However, with that caveat, the results of this study still provide useful information for developing and targeting educational programs.

Because the study sample was drawn from the membership of the AAPD, there may be some associational membership bias present in the sample. That is, there may be some characteristic of pediatric dentists likely to join the AAPD which carry over into office practices.

V. REFERENCES

• American Academy of Pediatrics, Committee on Environmental Health. Environmental tobacco smoke: a hazard to children. [comments] Pediatrics, 99(4):639-42, 1997.

• American Dental Association. News of Dentistry. J Am Dent Assoc 69:776, 1964.

• American Dental Association. 1994 survey of current issues in dentistry. Chicago: ADA Survey Center, 1994.

• American Dental Association. 1999 2nd Quarter, Quarterly Survey of Dental Practice. Chicago: ADA Survey Center, 1999.

• Arday DR, Tomar SL, Nelson DE, Merritt RK, Schooley MW, Mowery P: State smoking prevalence estimates: comparison of the Behavioral Risk Factor Surveillance System and Current Population Surveys. Am J Pub Health 87(10):1665-69, 1997.

• Bader JD, Shugars DA: What do we know about how dentists make caries-related treatment decisions? Community Dent Oral Epidemiol 25:97-103, 1997.

• Barker GJ, Taylor TS, Barker BF: Implementation of a tobacco cessation program in the student clinics. J Dent Educ 59(8):850-55, 1995.

• Beeber SJ: Parental smoking and childhood asthma. J Ped Health Care 10(2):58-62, 1996.

• Belanger GK, Poulson TC: Smokeless tobacco: a potential health hazard for children. Ped Dent 5(4):266-69, 1983.

• Brezosky L: Cigar craze over, analysts say. In www.winetoday.com, Oct. 14, 1999.

• Brink SG, Gottlieb NH, McLeroy KR, Wisotzky M, Burdine JN: A community view of smoking cessation counseling in the practices of physicians and dentists. Public Health Reports 109(1):135-42, 1994.

• Burnett KF, Young PC: Ask, advise, assist: pediatricians and passive smoke exposure. Clinical Pediatrics 38(6):339-45, 1999.

• CDT-2: Current Dental Terminology, 2nd Edition: Users Manual. The comprehensive guide to accurate claims reporting. 1995-2000. American Dental Association, 1994.

• Campbell HS, Sletten M, Petty T: Patient perceptions of tobacco cessation services in dental offices. J Am Dent Assoc 130:219-26, 1999.

• Carbone D: Smoking and Cancer. Am J Med 93(suppl 1A):1A-13S-1A-17S, 1992.

• Centers for Disease Control and Prevention. Office on Smoking and Health. National Health Interview Survey, 1970, 1987, 1991.

• Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 1995 MMWR Morb Mortal Wkly Rep 46(51):1217-1220, 1997.

• Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 1994 MMWR Morb Mortal Wkly Rep 45(27):588-90, 1996.

• Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 1993 MMWR Morb Mortal Wkly Rep 43(50):925-930, 1994.

• Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 1992 MMWR Morb Mortal Wkly Rep 43(19):341-346, 1994.

• Centers for Disease Control and Prevention. Medical-care expenditures attributable to cigarette smoking—United States, 1993. MMWR Morb Mortal Wkly Rep 43(26):469-72, 1994.

• Centers for Disease Control and Prevention. Mortality trends for selected smoking-related cancers and breast cancer—United States, 1950-1990. MMWR Morb Mortal Wkly Rep 42(44):857-66, 1993.

• Centers for Disease Control and Prevention. National health interview survey—Cancer Control (NHIS-CC) Supplement, 1992.

• Centers for Disease Control and Prevention. Projected smoking-related deaths among youth—United States. MMWR Morb Mortal Wkly Rep 45(44):971-74, 1996.

• Centers for Disease Control and Prevention. Smoking-attributable mortality and years of potential life lost—United States, 1990. MMWR Morb Mortal Wkly Rep 42(33):645-49, 1993.

• Centers for Disease Control and Prevention. Smoking behavior and attitudes of physicians, dentists, nurses and pharmacists. MMWR Morb Mortal Wkly Rep 26(10):185, 1977.

• Centers for Disease Control and Prevention. Smoking prevalence and cessation in selected states, 1981-1983 and 1985-The behavioral risk factor survey. MMWR Morb Mortal Wkly Rep 35(47):740-43, 1985.

• Centers for Disease Control and Prevention. State-specific prevalence of cigarette smoking among adults, and children's and adolescents' exposure to environmental tobacco smoke—United States, 1996, MMWR Morb Mortal Wkly Rep 46(44):1038-43, 1997.

• Centers for Disease Control and Prevention. Web Site: www.cdc.gov/tobacco: Tobacco control highlights, 1999.

• Centers for Disease Control and Prevention. Web Site (2): www.cdc.gov/nchswww/nchshome/htm, 1999.

• Centers for Disease Control and Prevention. Web Site (3): www2.cdc.gov/nccdphp/osh/state/report_index.htm, 1999.

• Centers for Disease Control and Prevention. Web Site (4): www.cdc.gov/tobacco/who/usa.htm, 2000.

• Cheney HG: Smoking policies of U.S. dental schools. J Dent Educ 54(3):216-17, 1990.

• Chestnutt IG, Binnie VI: Smoking cessation counseling -- a role for the dental professional? Br Dent J 179:411-15, 1995.

• Chng CL, Biernat KH, Fridinger F: A national study of the knowledge and attitudes of dental hygiene students on smokeless tobacco. Health Values 14(3):38-43, 1990.

• Christen AG: The case against smokeless tobacco: five facts for the health professional to consider. J Am Dent Assoc 101:464-69, 1980.

• Christen AG: The impact of tobacco use and cessation on oral and dental diseases and conditions. Am J Med 93(suppl 1A):1A-25S-1A-31S, 1992.

• Christen AG: Survey of smoking behavior and attitudes of 630 American dentists: current trends. J Am Dent Assoc 109:271-2, 1984.

• Christen AG, Klein JA, Christen JA, McDonald JL, Guba CJ: How-to-do-it quit-smoking strategies for the dental office team: an eight-step program. J Am Dent Assoc Supplement:20-S-27-S, January 1990.

• Christen AG, McDonald JL, Klein JA, Christen JA, Guba CJ: A smoking cessation program for the dental office. Indiana University Nicotine Dependence Program booklet, Indiana University School of Dentistry, Department of Oral Biology.

• Christen AG, McDonald JL, Olsen BL, Drook CA, Stookey GK: Efficacy of a nicotine chewing gun in facilitating smoking cessation. J Am Dent Assoc 108:584-97, 1984.

• Christen AG, Olson BL, Sampson VM, McDonald JL: Intensive quit smoking program in a dental setting using nicotine gum: one year results. J Calif Dent Assoc 14:28-34, 1986.

• Christen AG, Swanson BZ, Glover ED, Henderson AH: Smokeless tobacco: the folklore and social history of snuffing, sneezing, dipping, and chewing. J Am Dent Assoc 105:821-29, 1982.

• Clark DB, Kirisci L, Moss HB: Early adolescent gateway drug use in sons of fathers with substance use disorders. Addictive Behaviors 23(4):561-66, 1998.

• Cohen SJ, Christen AG, Katz BP, Drook CA, Davis BJ, Smith DM, Stookey GK: Counseling medical and dental patients about cigarette smoking: the impact of nicotine gum and chart reminders. Am J Pub Health 77(3):313-16, 1987.

• Cohen SJ, Kelly SA, Eason AA: Establishing smoking cessation programs in dental offices. J Am Dent Assoc Supplement 28-S-31-S, January 1990.

• Cohen SJ, Stookey GK, Katz BP, Drook CA, Christen AG: Helping smokers quit: a randomized controlled trial with private practice dentists. J Am Dent Assoc 118(1):41-45, 1989.

• Cohen SJ, Stookey GK, Katz BP, Drook CA, Smith DM: Encouraging primary care physicians to help smokers quit: A randomized, controlled trial. Ann Int Med 110:648-52, 1989.

• Connolly GN, Winn DM, Hecht SS, Henningfield JE, Walker B, Hoffmann D: The reemergence of smokeless tobacco. New Engl J of Medicine 314(16):1020-27, 1986.

• Cooper TM, Clayton RR: Nicotine reduction therapy and relapse prevention for heavy smokers: 3-year follow-up. J Am Dent Assoc Supplement 32-S-36-S, January 1990.

• Cooper TM, Clayton RR: Stop-smoking program using nicotine reduction therapy and behavior modification for heavy smokers. J Am Dent Assoc 118:47-52, 1989.

• Crews KM, Nichols M: Patient management in a tobacco-cessation program in the dental practice. Compend Contin Educ Dent 25(9):1142-1156, 1994.

• Cummings KM, Giovino G, Sciandra R, Koenigsberg M, Emont SL: Physician advice to quit smoking: who gets it and who doesn't. Am J Prev Med 3(2):69-75, 1987.

• Cummings SR, Coates TJ, Richards RJ, Hansen B, Zahnd EG, VanderMartin R, Duncan C, Gerbert B, Martin A, Stein MJ: Training physicians in counseling about smoking cessation: a randomized trial of the "Quit for Life" program. Ann Intern Med 110:640-47, 1989.

• Davis RM: Symposium charge. J Am Dent Assoc Supplement 1-S, January 1990.

• Davis RM: Uniting physicians against smoking: the need for a coordinated national strategy. J Am Med Assoc 259:2900-01, 1988.

• Dietrich AJ, O'Connor GT, Keller A, Carney PA, Levy D, Whaley FS: Cancer: improving early detection and prevention. A community practice randomised trial. Br Med J 304:687-691, 1992.

• Dolan TA, McGorray SP, Grinstead-Skigen CL, Mecklenburg R: Tobacco control activities in U.S. dental practices. JADA 128:1669-79, 1997.

• Epi Info, Version 6.03: A word processing, database, and statistics program for epidemiology on microcomputers. Atlanta: Centers for Disease Control and Prevention.

• Epps RP, Manley MW, Glynn TJ: Tobacco use among adolescents. Pediatric Clinics of North Amer 42(2):389-410, 1995.

• Erickson PR, Thomas HF: A survey of the American Academy of Pediatric Dentistry membership: infant oral health care. Pediatric Dent 19(1):17-21, 1997.

• Fiore MC, Pierce JP, Remington PL, Fiore BJ: Cigarette smoking: the clinician's role in cessation, prevention, and public health. Disease-a-Month:183-241, April 1990.

• Folsom AR, Grimm RH: Stop smoking advice by physicians: a feasible approach? Am J Pub Health 77(7):849-50, 1987.

• Forrest JL, Horowitz AM, Shmuely Y: Dental hygienists knowledge, opinions and practices related to oral cancer. Abstract reproduced in J Dent Res 77(IADR Abstracts):826, 1998.

• Fried J: Oral health professions education: working towards a tobacco-free society. Health Values 16(1):48-51, 1992.

• Fried JL, Cohen LA: Maryland dentists' attitudes regarding tobacco issues. Clin Prev Dent 14(2);10-16, 1992.

• Fried JL, Rubinstein L: Dental hygienists' anti-tobacco role: educational perspectives. J Dent Educ 53:712-17, 1989.

• Fried JL, Rubinstein L: Attitudes and behaviors of dental hygienists concerning tobacco use. J Pub Health Dent 50(3), 1990.

• Fried JL, Rubinstein-DeVore L: Tobacco use cessation curricula in U.S. dental schools and dental hygiene programs. J Dent Educ 54(12):730-35, 1990

• Geboy MJ: Dentists' involvement in smoking cessation counseling: a review and analysis. J Am Dent Assoc 118:79-83, 1989

• Gerbert B, Coates T, Zahnd E, Richard RJ, Cummings SR: Dentists as smoking cessation counselors. J Am Dent Assoc 118:29-32, 1989.

• Gilbert JR, Wilson DM, Singer J, Lindsay EA, Willms DG, Best JA, Taylor DW: A family physician smoking cessation program: an evaluation of the role of follow-up visits. Am J Prev Med 8(2):91-95, 1992.

• Giunta JL, Connolly G: The reversibility of leukoplakia caused by smokeless tobacco. J Am Dent Assoc 113:50-52, 1986.

• Glynn TM, Boyd GM, Gruman JC: Essential elements of self-help/minimal intervention strategies for smoking cessation. Health Educ Q 17(3):329-45, 1990.

• Glynn TJ: Relative effectiveness of physician-initiated smoking cessation programs. Canc Bull 40(6):359-64, 1988.

• Goedhart H, Eijkman MA, ter Horst G: Quality of dental care: the view of regular attenders. Community Dent Oral Epidemiol 24:28-31, 1996.

• Goepferd SJ: Smokeless tobacco: a potential hazard to infants and children. J Am Dent Assoc 113:49-50, 1986.

• Goldman LK; Glantz SA: Evaluation of antismoking advertising campaigns. J Am Med Assoc 279(10):772-777, 1998.

• Greer RO, Poulson TC: Oral tissue alterations associated with the use of smokeless tobacco by teen-agers. Part I. Clinical findings. Oral Surg 56:275-84, 1983.

• Greer RO, Poulson TC, Boone ME, Lindenmuth JE, Crosby L: Smokeless tobacco-associated oral changes in juvenile, adult and geriatric patients: clinical and histomorphologic features. Gerodontic 2:87-98, 1986.

• Gritz ER, Baer-Weiss V, Benowitz NL, Van Vunakis H, Jarvik ME: Plasma nicotine and cotinine concentrations in habitual smokeless tobacco users. Clin Pharmacol Ther 30:201-09, 1981.

• Guba CJ: A patient-oriented smoking cessation program conducted in a dental school clinical setting. J Am Dent Assoc Supplement:37-S-39-S, 1990.

• Guggenheimer J, Zullo TG, Kruper DC, Verbin RS: Changing trends of tobacco use in a teenage population in western Pennsylvania. Amer J Pub Health 76(2):196-97, 1986.

• Hampson NB: Smokeless is not saltless. N Engl J Med 312:919-20, 1985.

• Hastreiter RJ, Bakdash B, Roesch MH, Walseth J: Use of tobacco prevention and cessation strategies and techniques in the dental office. J Am Dent Assoc 125:1475-84, 1994.

• Healthy People 2000: National health promotion and disease prevention objectives. DHHS Publication No. (PHS) 91-50212, U.S. Government Printing Office, Washington, DC, 1990.

• Henningfield JE: Understanding nicotine addiction and physical withdrawal process. J Am Dent Assoc Supplement:2-S-6-S, 1990.

• Hirsch J-M, Heyden G, Thilander H: A clinical, histomorphological and histochemical study on snuff-induced lesions of varying severity. J Oral Pathology 11:387-98, 1982.

• Hovell MF, Slymen DJ, Jones JA, Hofstetter CR, Burkham-Kreitner S, Conway TL, Rubin B, Noel D: An adolescent tobacco-use prevention trial in orthodontic offices. Am J Pub Health 86(12):1760-66, 1996.

• Hsu SC, Pollack RL, Hsu A-FC, Going RE: Sugars present in tobacco extracts. J Amer Dent Assoc 101:915-18, 1980.

• Hunter SM, Croft JB, Burke GL, Parker FC, Webber LS, and Berenson GS: Longitudinal patterns of cigarette smoking and smokeless tobacco use in youth: the Bogalusa heart study. Amer J Pub Health 76(2):193-95, 1986.

• Jaaen CR, Stange KC, Tumiel LM, Nutting P: Missed opportunities for prevention: smoking cessation counseling and the competing demands of practice. J Family Practice 45(4):348-54, 1997.

• Janz NK, Becker MH, Kirscht JP, Eraker SA, Billi JE, Woolliscroft JO: Evaluation of a minimal-contact smoking cessation intervention in an outpatient setting. Am J Public Health 77(7):805-09, 1987.

• Jones JK, Triplett RG: The relationship of cigarette smoking to impaired intraoral wound healing: a review of evidence and implications for patient care. J Oral Maxillofac Surg 50:237-39, 1992

• Jones RB, Pomrehn PR, Mecklenburg RE, Lindsay EA, Manley M, Ockene JK: The COMMIT dental model: tobacco control practices and attitudes. J Am Dent Assoc 124(9):92-104, 1993.

• Kann L, Kinchen SA, Williams BI, Ross JG, Lowry R, Hill CV, Grunbaum JA, Blumson PS, Collins JL, Kolbe LJ: Youth risk behavior surveillance—United States, 1997. J Sch Health 68(9):355-369,1998.

• Kellam SG, Anthony JC: Targeting early antecedents to prevent tobacco smoking: findings from an epidemiologically based randomized field trial. Am J Pub Health 88(10):1490-95, 1998.

• Klein JD, Portilla M, Goldstein A, Leininger L: Training pediatric residents to prevent tobacco use. Pediatrics 96:326-30, 1995.

• Kleinman DV, Swango PA, Pindborg JJ: Epidemiology of oral mucosal lesions in United States schoolchildren: 1986-1987. Community Dent Oral Epidemiol 22:243-53, 1994.

• Kosower E, Ernst A, Taub B, Berman N, Andrews J, Seidel, J: Tobacco prevention education in a pediatric residency program. Archives of Pediatrics and Adolescent Med 149(4):430-35, 1995.

• Kottke TE, Battista RN, DeFriese GH, Brekke ML: Attributes of successful smoking cessation interventions in medical practice: a meta-analysis of 39 controlled trials. J Am Med Assoc 259(19):2883-89, 1988.

• Kviz FJ, Clark MA, Hope H, Davis AM: Patients' perceptions of their physician's role in smoking cessation by age and readiness to stop smoking. Prev Med 26:340-49, 1997.

• Lacitis E: Cigars? Just another trend on the ash heap. In www.seattletimes.com, Oct. 17, 1999.

• Lahti S, Tuutti H, Hausen H, Kaariainen R: Patients' expectations of an ideal dentist and their views concerning the dentist they visited: do the views conform to the expectations and what determines how well they conform? Community Dent Oral Epidemiol 24:240-44, 1996.

• Lakier JB: Smoking and cardiovascular disease. Am J Med 93(suppl 1A):1A-8S-1A-12S, 1992.

• Lakshmipathy N, Bokesch PM, Cowen DE, Lisman SR, Schmid CH: Environmental tobacco smoke: a risk factor for pediatric laryngospasm. Anesthesia and Analgesia 82(4):724-27, 1996.

• Lesmes GR: Corporate healthcare costs and smoke-free environments. Am J Med 93(suppl 1A):1A-48S-1A-54S, 1992.

• Lesmes GR: Passive smoking: the medical and economic issues. Am J Med 93(suppl 1A):1A-38S-1A-42S, 1992.

• Li VC, Coates TJ, Ewart CK, Kim YJ: The effectiveness of smoking cessation advice given during routine medical care: physicians can make a difference. Am J Prev Med 3(2):81-86, 1987.

• Lindemeyer RG, Baum RH, Hsu SC, Going RE: In vitro effect of tobacco on the growth of oral cariogenic streptococci. J Am Dent Assoc 103:719-22, 1981.

• Locker D: Smoking and oral health in older adults. Can J Pub Health 83:429-32, 1992.

• Logan H, Levy S, Ferguson K, Pomrehn P, Muldoon J: Tobacco-related attitudes and counseling practices of Iowa dentists. Clinical Prev Dent 14(1):19-22, 1992.

• Lynch BS, Bonnie RJ, eds. "Toward a youth-centered prevention policy" and "Social Norms and the Acceptability of Tobacco Use." In *Growing Up Tobacco Free* Washington, D.C., National Academy Press:3-25, 74, 1994.

• Marty PJ, McDermott RJ, Williams T: Patterns of smokeless tobacco use in a population of high school students. Amer J Pub Health. 76(2):190-92, 1986.

• McCann D: Tobacco use and oral health. J Am Dent Assoc 118:19-25, 1989.

• McPhee SJ, Richard RJ, Solkowitz SN: Performance of cancer screening in a university general internal medicine practice: Comparison with the 1980 American Cancer Society guidelines. J Gen Intern Med 1:251-81, 1986.

• Mecklenburg RE: The National Cancer Institute's invitation to dental professionals in smoking cessation. J Am Dent Assoc Supplement 40-S-41-S, 1990.

• Mecklenburg RE, Christen AG, Gerbert B, Gift HC, Glynn TJ, Jones RB, Lindsay E, Manley MW, Severson H: How to help your patients stop using tobacco: A National Cancer Institute Manual for the Oral Health Team. Bethesda, MD: US DHHS, Public Health Service, National Institutes of Health, National Cancer Institute, NIH publication no. 93-3191, 1993.

• Mullins R: Attitudes and smoking habits of dentists in Victoria: 16 years on. Australian Dent J 39(5):324-26, 1994.

• Ockene JK: Physician-delivered intervention for smoking cessation: strategies for increasing effectiveness. Prev Med 16:723-37, 1987.

• Ockene JK, Quirk ME, Goldberg RJ, Kristellar JL, Donnelly G, Kalan KL, Gould B, Greene HL, Harrison-Atlas R, Pease J, Pickens S, Williams JW: A residents' training

program for the development of smoking intervention skills. Arch Intern Med 148:1039-45, 1988.

• Orleans CT: Understanding and promoting smoking cessation: Overview and guidelines for physician intervention. Ann Rev Med 36:51-61, 1985.

• O'Shea R, Sowinski J, Dietrich C, Johnson F, Bleck S: Hygiene students' conceptions of the role of the dental hygienist in smoking cessation. Health Values 16(2):44-50, 1992.

• Owen N, Davies MJ: Smokers' preferences for assistance with cessation. Prev Med 19:424-31, 1990.

• Paralusz KM: Ashes to ashes: why FDA regulation of tobacco advertising may mark the end of the road for the Malboro man. Am J Law Med 24(1):89-122, 1998.

• Perez-Stable EJ, Fuentes-Afflick E: Role of clinicians in cigarette smoking prevention. West J Med 169:23-29, 1998.

• Pomerleau OF: Nicotine and the central nervous system: biobehavioral effects of cigarette smoking. Am J Med 93(suppl 1A):1A-2S-1A-7S, 1992.

• Price JH, Beach P, Everett S, Telljohan SK, Lewis L: Evaluation of a three-year urban elementary school tobacco prevention program. J Sch Health 68(1):26-31, 1998.

• Rosen MA, Logsdon DN, Demak MM: Prevention and health promotion in primary care: baseline results on physicians from the INSURE project on lifecycle preventive health services. Prev Med 13:535-48, 1984.

• Russell MAH, Jarvis MJ, Devitt G, Feyerabend C: Nicotine intake by snuff users. Br Med J 283:814-17, 1981.

• Russell MAH, Merriman R, Stapleton J, Taylor W: Effects of nicotine chewing gum as an adjunct to general practitioners' advice against smoking. Br Med J 287:1782-85, 1983.

• Russell MAH, Wilson C, Taylor C, Baker CD: Effect of general practitioners' advice against smoking. Br Med J 2:231-35, 1979.

• Sachs DPL: Smoking cessation strategies: what works, what doesn't. J Am Dent Assoc Supplement 119:13-S-19-S, 1990.

• Satcher D: Cigars and public health. Editorial. N Engl J Med 340:1829-31, 1999.

• Schneider NG: Psychopharmacologic treatment of cigarette smoking. J Am Dent Assoc Supplement 119: 7-S-12-S, 1990.

• Schroeder KL: P.L. 99-252—Implications for dentists and their clinical practice. J Pub Health Dent 50(1):84-89, 1990.

• Schroeder KL, Chen MS: Smokeless tobacco and blood pressure. N Engl J Med 312(14):919, 1985.

• Schroeder KL, Iaderosa GB, Chen MS, Glover ED, Edmundson EW: Bimodal initiation of smokeless tobacco usage: implications for cancer education. J Cancer Educ 2(1):15-21, 1987.

• Schroeder KL, Soller HA, Chen MS, Neal CJ, Glover ED: Screening for smokeless tobacco-associated lesions: recommendations for the dental practitioner. J Am Dent Assoc 116:37-42, 1988.

• Secker-Walker RH, Hill HC, Solomon LJ, Flynn BS: Smoking cessation practices in dental offices. J Pub Health Dent 47(1):10-15, 1987.

• Secker-Walker RH, Solomon LJ, Flynn BS: Comparison of the smoking cessation counseling activities of six types of health professionals. Prev Med 23:800-08, 1994.

• Secker-Walker RH, Solomon LJ, Hill HC: A statewide survey of dentists' smoking cessation advice. J Am Dent Assoc 118:37-40, 1989.

• Severson HH: Psychosocial factors in the use of smokeless tobacco and their implications for P.L. 99-252. J Pub Health Dent 50(1):90-97, 1990.

• Severson HH, Andrews JA, Lichtenstein E, Gordon JS, Barckley MF: Using the hygiene visit to deliver a tobacco cessation program: results of a randomized trial. J Am Dent Assoc 129(7):993-99, 1998.

• Severson HH, Eakin EG, Stevens VJ, Lichtenstein E: Dental office practices for tobacco users: independent practice and HMO clinics. Am J Pub Health 80(12):1503-05, 1990.

• Silversin J: Communicating with each other. International Dent J 39(4):258-62, 1989.

• Silvertstein P: Smoking and wound healing. Am J Med 93(suppl 1A):1A-22S-1A-24-S, 1992.

• Skjölderbrand J, Gahnberg L: Tobacco preventive measures by dental care staff. An attempt to reduce the use of tobacco among adolescents. Swed Dent J 21:49-54, 1997.

• SmithKline Beecham. *Gallup Report: A National Survey of Americans Who Smoke.* New York, 1993.

• Solberg LI, Maxwell PL, Kottke TE, Gepner GJ, Brekke ML: A systematic primary care office-based smoking cessation program. J Fam Prac 30(6):647-54, 1990.

• Stevens VJ, Severson H, Lichtenstein E, Little SJ, Leben J: Making the most of a teachable moment: a smokeless-tobacco cessation intervention in the dental office. Am J Pub Health 85(2):231-235, 1995.

• Sherman SJ, Presson CC, Chassin L, Corty E, Olshavsky R: The false consensus effect in estimates of smoking prevalence: underlying mechanisms. Pers Social Psych Bull 9(2):197-207, 1983.

• Sussman S, Dent CW, Mestel-Rauch J, Johnson CA, Hansen WB, Flay BR: Adolescent nonsmokers, triers, and regular smokers' estimates of cigarette smoking prevalence: when do overestimates occur and by whom? J Applied Soc Psych 18(7):537-551, 1988.

• Telivuo M, Kallio P, Berg M-A, Korhonen HJ, Murtomaa H: Smoking and oral health: a population survey in Finland. J Public Health Dent 55(3):133-38, 1995.

• Telivuo M, Vehkalahti M, Lahtinen A, Murtomaa H: Finnish dentists as tobacco counselors. Community Dent Oral Epidemiol 19:221-4, 1991.

• Tomar SL, Husten CG, Manley MW: Do dentists and physicians advise tobacco users to quit? J Am Dent Assoc 127:259-65, 1996.

• Tomar SL, Winn DM, Swango PA, Giovino GA, Kleinman DV: Oral mucosal smokeless tobacco lesions among adolescents in the United States. J Dent Res 76(6):1277-1286, 1997.

• Torabi MR, Bailey WJ, Majd-Jabbari M: Cigarette smoking as a predictor of alcohol and other drug use by children and adolescents: evidence of the "gateway drug effect". J School Health, 63:302-306, 1993.

• Tsevat J: Impact and cost-effectiveness of smoking interventions. Am J Med 93(suppl 1A):1A-43-S-1A-47-S, 1992.

• US Department of Health and Human Services. Clinical practice guideline number 18: smoking cessation. Rockville, MD: US DHHS, Agency for Health Care Policy and Research publication no. 96-0692, 1996.

• US Department of Health and Human Services. The health consequences of using smokeless tobacco: a report of the advisory committee to the Surgeon General. NIH Publ. No. 86-2874, Bethesda, MD, June, 1986.

• US Department of Health and Human Services. The health consequences of smoking: 25 years of progress. A report of the Surgeon General. Washington, D.C.: U.S. Government Printing Office, DHHS publication no. (CDC) 89-8411, 1989.

• US Department of Health and Human Services. Preventing tobacco use among young people. A report of the Surgeon General. Washington, D.C.: U.S. Government Printing Office, DHHS, S/N 017-001-004901-0, 1994.

• Waldman, HB: Do your pediatric patients drink alcohol? Are they heavy or binge drinkers? J Dent for Children 65(3):194-97, 1998.

• Wiencke JK, Thurston SW, Kelsey KT, Varkonyi A, Wain JC, Mark EJ, Christian DC: Early age at smoking initiation and tobacco carcinogen DNA damage in the lung. J Nat Canc Inst 91(7):614-19, 1999.

• Williams RR, Horm HW: Association of cancer sites with tobacco and alcohol consumption and socioeconomic status of patients: interview study from the Third National Cancer Survey. J National Canc Inst 58:525-47, 1977.

• Wilson DM, Taylor DW, Gilbert JR, Best JA, Lindsay EA, Willms DG, Singer J: A randomized trial of a family physician intervention for smoking cessation. J Am Med Assoc 260(11):1570-74, 1988.

• Winn DM, Blot WJ, Shy CM, Pickle LW, Toledo A, Fraumeni JF: Snuff dipping and oral cancer among women in the southern United States. N Engl J Med 304(13):745-9, 1981.

• Wood GJ, Cecchini JJ, Nathason N, Hiroshige K: Office-based training in tobacco cessation for dental professionals. J Am Dent Assoc 128:216-224, 1997.

• Woodruff TJ, Rosbrook B, Pierce J, Glantz S: Lower levels of cigarette consumption found in smoke-free workplaces in California. Archives Int Med 153(28 Jun):1485-1493, 1993.

• Woolf AD: Smoking and nicotine addiction: a pediatric epidemic with sequelae in adulthood. Current Opinion in Pediatrics 5:470-77, 1997.

• World Health Organization Collaborating Centre for Oral Precancerous Lesions. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. Oral Surg 46(4):518-39, 1978.

• Young TL, Zimmerman R: Clueless: Parental knowledge of risk behaviors of middle school students. Arch Pediatr Adolesc Med 152:1137-39, 1998.

• Zapka JG, Fletcher K, Pbert L, Druker SK, Ockene JK, Chen L: The perceptions and practices of pediatricians: tobacco intervention. Pediatrics 103(5):e65, 1999.

• Zhu J-F, Hidalgo HA, Holmgreen WC, Redding SW, Hu J, Henry RJ: Dental management of children with asthma. Pediatric Dent 18(5):363-70, 1996.

VI. APPENDICES

APPENDIX A: COVER LETTER AND SURVEY

Dear Doctor,

I am a pediatric dental resident at the University of California, San Francisco, and a member of the AAPD. I am doing a study to determine the practices, attitudes, and knowledge of pediatric dentists, related to tobacco use prevention and cessation, as part of my pediatric dentistry training and masters' research at UCSF.

Tobacco use has been called a pediatric disease, since smoking and smokeless tobacco use are nearly always begun, developed, and established during adolescence.

Because you are a member of the AAPD, I am asking you to fill out and return the enclosed survey, which will take about 10 minutes of your time.

Confidentiality: Your responses will be kept as confidential as possible. Study information will be coded, and kept in locked files. Only study personnel will have access to the files. Confidential identifiers will be purged from the files once they are no longer needed. No individual identities will be used on any reports or publications resulting from the study.

Risks: The principal risk to you is loss of confidentiality, however, we will work hard to protect you from this risk. Some of the questions may make you uncomfortable, but you may decline to answer any questions you do not wish to answer. You may also be inconvenienced by taking the time to answer the survey.

Benefits: There will be no direct benefit to you from completing this survey. The anticipated benefit of this study is a better understanding of the knowledge, attitudes, and practices of pediatric dentists related to tobacco use prevention and cessation. This is important for assessing pediatric dentists' actual and potential involvement in tobacco education, and for improving patient health.

Payment: There will be no payment for participation in the study.

Voluntary Nature: Completion of this survey is voluntary.

Consent: Your return of the survey will be understood to mean that you consent to participate.

For any questions about the study, you may contact Dr. Jennifer Ryan by calling: (415) 502-1647, writing: UCSF, Division of Pediatric Dentistry, 707 Parnassus Ave. Box 0438, San Francisco, CA 94143, or e-mail: jenryan@itsa.ucsf.edu.

If for some reason you do not wish to contact Dr. Ryan, you may contact the Committee on Human Research, which is concerned with protection of volunteers in research projects. You may reach the Committee office between 8:00am and 5:00pm Pacific Standard Time by calling (415) 476-1814, or by writing to the Committee on Human Research, Suite 11, Laurel Heights Campus, Box 0616, University of California, San Francisco, San Francisco, CA 94143.

Thank you for your time and cooperation in completing and returning this survey.

Sincerely,

Jennifer Ryan, D.D.S.

ID#: _____

University of California, San Francisco
Division of Pediatric Dentistry

Tobacco Control for Adolescents in U.S. Pediatric Dental Practices

Instructions: Please place a check next to your response, or circle your response where indicated.

1. Your age: _____years

2. Your gender: Male ___ Female___

3. Do you consider yourself: Asian/Pacific Islander___ Black/African American___ Latino/Latina___
White/Caucasian___ Native American___ Other_____

4. Year of graduation from dental school: 19___

5. Would you describe your primary practice as:
(a) private___ academic___ hospital___ public health___ military___ other_____
(b) solo practitioner___ group practice___ other_____

6. Would you describe the location of your primary practice as:
urban (pop. ≥300,000) ___ suburban (>2500 but <300,000) ___ rural (≤2500) ___

7. (a) Do you currently provide clinical patient care? Yes___ No___(If no, please stop and return survey.)
(b) Average number of days per week:_____

8. (a) Please estimate the number of patients you see in a typical day: _____
(b) Please estimate the number of **adolescent** patients (defined as ages 11-17) you see in a typical day: _____

In this survey, **tobacco users** are defined as smokers or smokeless tobacco users.
Smokers are defined as those individuals who use cigarettes, pipes, or cigars.
Smokeless tobacco users are defined as those individuals who use any form of snuff (moist, dry, or that packaged in sachet type tea bag-like pouches) or any form of chewing tobacco (loose leaf, plug, or twist).

9. Is tobacco use allowed anywhere in your office:
(a) By staff members Yes___ No___
(b) By patients or parents Yes___ No___

10. Which of the following describes your use of the listed products most closely?

Product:	Current Daily User	Current Occasional User	Former User	Experimented With	Never Used
a. Cigarettes	1	2	3	4	5
b. Pipes	1	2	3	4	5
c. Cigars	1	2	3	4	5
d. Smokeless Tobacco	1	2	3	4	5

11. How do you identify tobacco users in your practice? (Please check all that apply)
___I look for oral symptoms
___I detect tobacco odor
___I ask about tobacco use on the Health History form
___Other (specify)_____
___I ask patients about their tobacco use
___I ask parents about their children's tobacco use
___I am alerted by parents of tobacco users
___I do **not** identify tobacco users

12. In the past three months, approximately what percent of **adolescent** patients did you ask whether or not they:

Smoke:	Use **smokeless tobacco**:
___91-100%	___91-100%
___75-90%	___75-90%
___51-74%	___51-74%
___25-50%	___25-50%
___11-24%	___11-24%
___1-10%	___1-10%
___None	___None

13. Who in your office is responsible for asking about tobacco use? (Please check all that apply)
Dentist___ Dental assistant___ Hygienist___ Receptionist___ Health History Form___
Other (please indicate who):_____ No one person___ We do not ask___

14. In the past 3 months, of your patients who reported tobacco use, what percent did you advise to stop:

Of those who reported **smoking**:	Of those who reported **smokeless tobacco** use:
___91-100%	___91-100%
___75-90%	___75-90%
___51-74%	___51-74%
___25-50%	___25-50%
___11-24%	___11-24%
___1-10%	___1-10%
___None	___None
___No patients reported smoking	___No patients reported smokeless tobacco use

15. Please estimate how often you provide the following services to your **adolescent** patients. If you never provide these services, please indicate if you are willing to provide them to your **adolescent** patients.

	Always	Often	Sometimes	Never	If never, are you willing to:	
a. Ask about tobacco use	1	2	3	4	Yes	No
b. Encourage non-users to remain tobacco free	1	2	3	4	Yes	No
c. Have tobacco use prevention educational materials available in your reception area	1	2	3	4	Yes	No

16. Please estimate how often you provide the following services to your **adolescent patients who use tobacco.** If you never provide these services, please indicate if you are willing to provide them to your **adolescent patients who use tobacco.**

	Always	Often	Sometimes	Never	If never, are you willing to:	
a. Advise them to quit	1	2	3	4	Yes	No
b. Discuss specific strategies for quitting	1	2	3	4	Yes	No
c. Encourage them to set a quit date	1	2	3	4	Yes	No
d. Provide self-help or educational materials	1	2	3	4	Yes	No
e. Recommend nicotine gum	1	2	3	4	Yes	No
f. Recommend nicotine transdermal patch	1	2	3	4	Yes	No
g. Refer them to cessation clinics/programs	1	2	3	4	Yes	No
h. Provide follow-up for those trying to quit	1	2	3	4	Yes	No

17. Do you routinely document your **adolescent** patients' tobacco use status in their dental charts:

For **Tobacco Users**:	For **All** Adolescent Patients:
___always	___always
___usually	___usually
___sometimes	___sometimes
___never	___never

18. How much of a barrier do you think each of the following is, or would be, for you with regard to helping your adolescent patients stop tobacco use?

	Not a barrier	Somewhat of a barrier	A strong barrier
a. Lack of time	1	2	3
b. Lack of adequate reimbursement	1	2	3
c. Don't feel I could effectively help patients quit using tobacco	1	2	3
d. Feel patients are resistant to cessation services	1	2	3
e. Don't know what to say	1	2	3
f. Don't have materials to hand out	1	2	3
g. Don't know where to send patients for counseling	1	2	3
h. Most of my adolescent patients do not use tobacco	1	2	3
i. Don't feel this is appropriate for a pediatric dentist	1	2	3
j. Did not occur to me to provide these services	1	2	3
k. Have been unsuccessful in providing these services in the past	1	2	3

Please describe any other reasons you have for not providing these services:_____

19. Have you received formal training in tobacco use prevention or cessation intervention strategies?
Yes___ (answer 'a' and 'b') No___(skip to #20)

a. If yes, estimate the total number of hours:___

b. How did you receive this training? (check all that apply)
___continuing education course
___organized study club
___pediatric dentistry residency training
___dental school curriculum
___pharmaceutical company program
___other (specify)_____

20. Would you be willing to receive tobacco use prevention and cessation training?
Yes___(answer 'a') No___(skip to #21)

a. If yes, indicate what you would be willing to do: (check all that apply)
___attend a continuing education course on the subject
___attend an organized study club meeting on the subject
___attend a pharmaceutical company program
___read about tobacco prevention and cessation strategies
___other (specify)_____

21. Please indicate how well prepared you feel to do the following, for your **adolescent** patients:

	Very well prepared	Well prepared	Minimally prepared	Unprepared
a. Ask about tobacco use	1	2	3	4
b. Advise users to quit	1	2	3	4
c. Assist users with the quitting process	1	2	3	4

22. Please circle the number below the response that best indicates your agreement with the following statements.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. It is a pediatric dentist's responsibility to convince patients who use tobacco to stop.	1	2	3	4	5
b. It is a pediatric dentist's responsibility to help patients who wish to stop using tobacco to accomplish this.	1	2	3	4	5
c. A pediatric dentist's time can be much better spent doing things other than trying to reduce tobacco use in adolescent patients.	1	2	3	4	5
d. Most adolescent tobacco users can stop if they want to.	1	2	3	4	5
e. The pediatric dentist should set a good example by not using tobacco.	1	2	3	4	5
f. Most adolescents will not give up tobacco use even if their pediatric dentist tells them to.	1	2	3	4	5
g. Most adolescent tobacco users have a hard time quitting because they are addicted to nicotine.	1	2	3	4	5
h. Adolescents have enough problems without adding to them by trying to give up tobacco.	1	2	3	4	5
i. Pediatric dentists should be more active than they have been in speaking before lay groups about tobacco use.	1	2	3	4	5
j. It is important for a pediatric dentist to ask adolescent patients about tobacco use.	1	2	3	4	5
k. It is important for a pediatric dentist to encourage adolescent non-users to remain tobacco free.	1	2	3	4	5

For #23-26, please place an "X" next to your response.

23. About one out of three U.S. adolescents uses tobacco by age 18:
True___ False___ Don't know___

24. In the last 25 years the number of adolescents in the U.S. using smokeless tobacco has:
Decreased___ Remained the same___ Doubled___ Tripled___ Don't know___

25. Less than 1000 adolescents in the U.S. become regular smokers every day:
True___ False___ Don't know___

26. What proportion of first-time cigarette use occurs before high school graduation:
25%___ 50%___ 75%___ 90%___ Don't know___

Comments:_____

_____

_____

_____

_____

Thank you for participating. Please return this survey in the postage-paid envelope provided.

APPENDIX B: TELEPHONE QUESTIONAIRRE

Survey No._____
Name_____
Phone # (____)____--_____
State_____

Date of first call _____
Time of first call _____
Best time to call back _____

1. Why was the doctor unable to return the survey?
   a. no **time**
   b. tobacco use not a **problem** in office
   c. not an **appropriate topic** for pediatric dentist
   d. not **interested** in participating
   e. not **practicing** dentistry
   f. other _____

2. Is the doctor practicing **pediatric** dentistry? Yes_____ No_____ (If no: is the doctor practicing dentistry? _____)

3. Year of graduation from dental school _____

4. Age_____

5. Ethnicity_____
   Caucasian_____ African American_____ Hispanic_____ Native American_____
   Asian American_____

6. Has the doctor used tobacco in the past, or does the doctor currently use tobacco?
   Yes_____ No_____
   Current_____ Past_____ Type of tobacco_____

7. Is tobacco use allowed in the office? Yes_____ No_____

8. Male_____ Female_____

Comments:_____
_____
_____
_____
_____
_____

APPENDIX C: SOURCES FOR TOBACCO USE INTERVENTION MATERIALS

Sources for tobacco use intervention materials, with phone number and name of the material(s) they offer:

- American Academy of Family Physicians (800-274-2237)
  - AAFP Stop Smoking Kit
  - Family Physician's Guide to Smoking Cessation
- American Cancer Society (404-320-3333)
  - Smoke Fighting: A Smoking Control Movement Building Guide
  - Smoke Signals: The Smoking Control Media Handbook
  - Tobacco-Free Young America: A Kit for the Busy Practitioner
- American Cancer Society: Wisconsin Division (608-249-0487)
  - Snuff Out Snuff (SOS): A Guide to School and Community Smokeless Tobacco Intervention
- American Dental Association (800-621-8099)
  - ADA package loan library on subjects requested from members
- American Lung Association (212-315-8700)
  - A Healthy Beginning Counseling Kit
  - Helping Smokers Get Ready to Quit
- Center for Corporate Public Involvement (202-624-2425)
  - Nonsmoking in the Workplace—A Guide for Employers
- Independent Video Services (503-345-3455)
  - Up to Snuff: A Handbook on Smokeless Tobacco
- Marion Merrell Dow, Inc. (800-362-7466)
  - A Smoking Cessation Program for the Dental Office
  - Dental Quit Kit
- Minnesota Coalition For A Smoke-Free Society 2000 (612-378-0902)
  - Clean Air Health Care—A Guide To Establish Smoke-Free Health Care Facilities
- National Cancer Institute (800-4-CANCER)
  - Guidelines: Media Strategies for Smoking Control
  - How to Help Your Patients Stop Smoking: A NCI Manual for the Oral Health Team
  - Tobacco Effects in the Mouth: a NCI and NIDR Guide for Health Professionals
  - Quit For Good (kit)
  - Smoking Policy Questions and Answers
- National Heart, Lung, and Blood Institute (301-951-3260)
  - Clinical Opportunities for Smoking Intervention—A Guide for the Busy Physician
- Texas Department of Health (512-458-7402)
  - Cleaning Up Your Patient's Smile: A Guide for Eliminating Tobacco Use
- U.S. Office on Smoking and Health (404-488-5705)
  - A Physician Talks About Smoking
  - Nicotine Addiction: The Health Consequences of Smoking: A report of the Surgeon General
  - 25 Years of Progress: Reducing the Health Consequences of Smoking: A report of

APPENDIX D: STATEWIDE CIGARETTE SMOKING PREVALENCE

Table 33: Statewide Cigarette Smoking Prevalence Among Adults Aged 18 and Older, 1997

State	Prevalence (percentage)		
Alabama	24.7	Montana	20.5
Alaska	26.7	Nebraska	22.2
Arizona	21.1	Nevada	27.7
Arkansas	28.5	New Hampshire	24.8
California	18.4	New Jersey	21.5
Colorado	22.6	New Mexico	22.1
Connecticut	21.8	New York	23.1
Delaware	26.6	North Carolina	25.8
District of Columbia	18.8	North Dakota	22.2
		Ohio	25.1
Florida	23.6	Oklahoma	24.6
Georgia	22.4	Oregon	20.7
Hawaii	18.6	Pennsylvania	24.3
Idaho	19.9	Rhode Island	24.2
Illinois	23.2	South Carolina	23.4
Indiana	26.3	South Dakota	24.3
Iowa	23.1	Tennessee	26.9
Kansas	22.7	Texas	22.6
Kentucky	30.8	Utah	13.8
Louisiana	24.6	Vermont	23.2
Maine	22.7	Virginia	24.6
Maryland	20.6	Washington	23.9
Massachusetts	20.4	West Virginia	27.4
Michigan	26.1	Wisconsin	23.2
Minnesota	21.8	Wyoming	24.0
Mississippi	23.2		
Missouri	28.7	**Median**	**23.2**

Statewide cigarette smoking prevalence as of December 31, 1997, was obtained from the Center for Disease Control. (•CDC, Web Site, 1999)

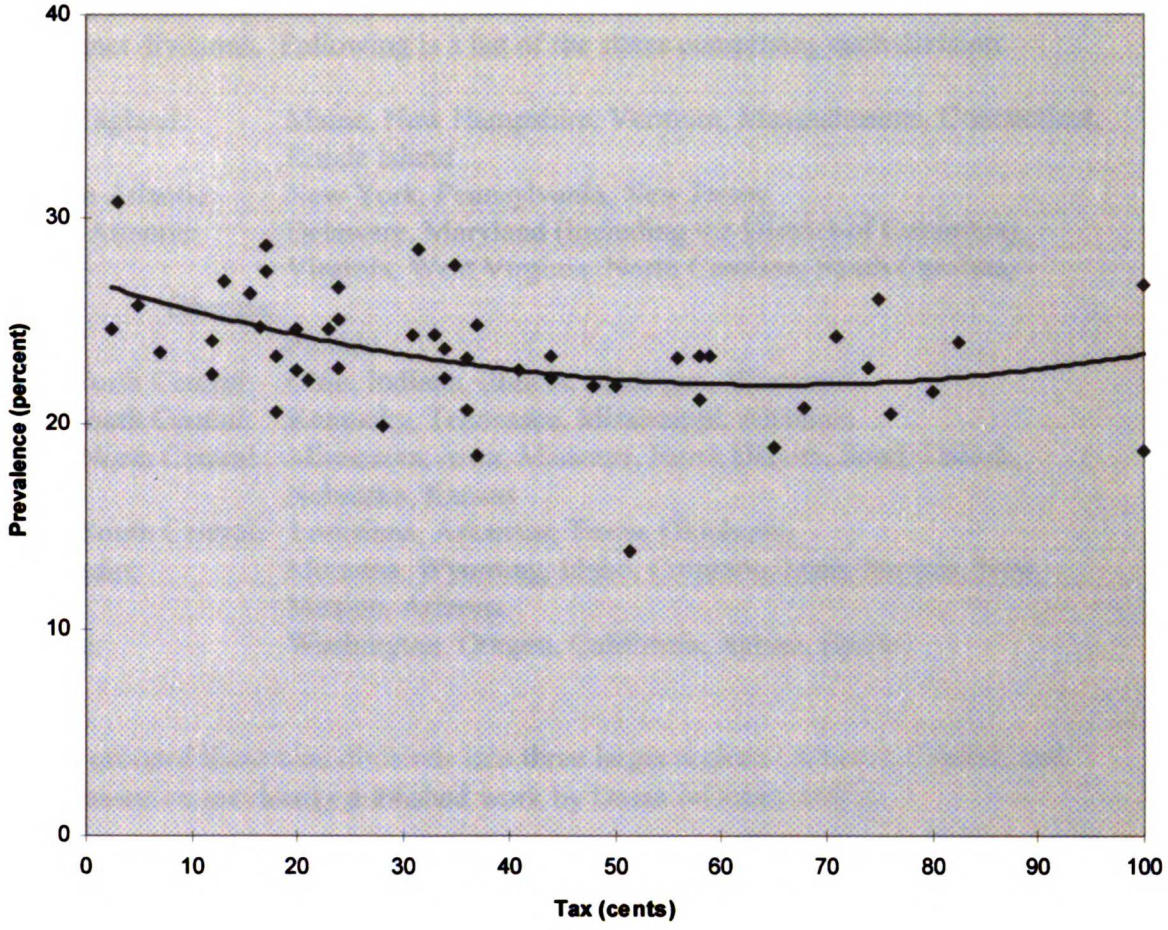
APPENDIX E: STATEWIDE CIGARETTE TAXES

Table 34: Statewide Cigarette Excise Taxes, 1998

State	Cents/pack		
Alabama	16.5	Montana	18.0
Alaska	100.0	Nebraska	34.0
Arizona	58.0	Nevada	35.0
Arkansas	31.5	New Hampshire	37.0
California	37.0	New Jersey	80.0
Colorado	20.0	New Mexico	21.0
Connecticut	50.0	New York	56.0
Delaware	24.0	North Carolina	5.0
District of Columbia	65.0	North Dakota	44.0
		Ohio	24.0
Florida	33.9	Oklahoma	23.0
Georgia	12.0	Oregon	68.0
Hawaii	100.0	Pennsylvania	31.0
Idaho	28.0	Rhode Island	71.0
Illinois	58.0	South Carolina	7.0
Indiana	15.5	South Dakota	33.0
Iowa	36.0	Tennessee	13.0
Kansas	24.0	Texas	41.0
Kentucky	3.0	Utah	51.5
Louisiana	20.0	Vermont	44.0
Maine	74.0	Virginia	2.5
Maryland	36.0	Washington	82.5
Massachusetts	76.0	West Virginia	17.0
Michigan	75.0	Wisconsin	59.0
Minnesota	48.0	Wyoming	12.0
Mississippi	18.0		
Missouri	17.0	**Median**	**37.8**

State cigarette taxes as of December 31, 1998, were obtained from the Center for Disease Control. (•CDC, Web Site, 1999)

APPENDIX F: Statewide Smoking Prevalence v. Statewide Cigarette Tax



APPENDIX G: DEFINITION OF GEOGRAPHIC REGIONS

A note about regional comparisons: using areas of the United States defined by the American Dental Association's Survey Center (•ADA, 1999), we divided the U.S. into nine distinct divisions. Following is a list of the states comprising each division:

1. New England:	Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island
2. Middle Atlantic:	New York, Pennsylvania, New Jersey
3. South Atlantic:	Delaware, Maryland (including the District of Columbia), Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida
4. East North Central:	Ohio, Indiana, Illinois, Michigan, Wisconsin
5. East South Central:	Kentucky, Tennessee, Mississippi, Alabama
6. West North Central:	Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas
7. West South Central:	Louisiana, Arkansas, Texas, Oklahoma
8. Mountain:	Montana, Wyoming, Idaho, Colorado, Utah, Nevada, New Mexico, Arizona
9. Pacific:	Washington, Oregon, California, Alaska, Hawaii

We then grouped these nine divisions into three larger regions (Atlantic, Central, and Pacific) based on previously published work by Dolan (•Dolan, 1997).

1. Atlantic Region:	New England, Middle Atlantic, and South Atlantic states
2. Central Region:	East North Central, East South Central, West North Central, West South Central states
3. Pacific Region:	Mountain and Pacific states