Adolescent Tobacco Use: Prevention and Cessation

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Smoking is an important cause of morbidity and mortality. Preventing and halting tobacco use are worthy strategies to improve the overall health of any population. Smoking and tobacco use begin during early adolescence, and most smokers try their first cigarette by age 12. A variety of psychosocial factors are involved in the initiation of tobacco use by adolescents. Strategies to prevent tobacco use should address these factors. Cessation efforts are hampered by nicotine addiction, which occurs in adolescents in a manner comparable to adults. Physicians and health care providers can assist adolescents in their attempts to quit tobacco use. A combination of counseling, peer and family support and, for some, nicotine replacement therapy, is the best approach to tobacco cessation. This paper reviews the findings of the major epidemiologic surveys of adolescent tobacco use and suggests strategies that health care providers can employ to reduce tobacco use among their adolescent patients.

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Smoking is the single most preventable cause of mortality, yet over 400,000 deaths are caused by smoking each year in the United States. Smoking causes more deaths every year than fires, automobile crashes, alcohol, cocaine, heroin, AIDS, murders, and suicides combined. Lung cancer has surpassed breast cancer as the leading cancer killer among women. Smoking is associated with cancers of the mouth, pharynx, larynx, esophagus, pancreas, uterus, cervix, kidney, and bladder. The Surgeon General of the United States has issued warnings about the dangers of smoking for nearly 40 years. Nonetheless, large numbers of young people begin smoking and become addicted to nicotine every day. Primary prevention of smoking among adolescents is an important part of any strategy to reduce tobacco-related deaths in the United States.

Youth Smoking Prevalence

The Youth Risk Behavior Surveillance System (YRBSS) is comprised of surveys conducted by the Centers for Disease Control and Prevention and state, territorial, and local health and education agencies. Since 1990, the YRBSS has reported on six categories of health risk behaviors among high school students, including tobacco use. Important insights can be gleaned from the findings of the 1999 YRBSS (Table 1) (1).

Across the United States, 70.4% of students reported having tried cigarette smoking. In general, this behavior increased as students progressed from grades 9 through 12 for both boys and girls. In Louisiana, the prevalence is higher than the national average with 75.9% of girls and 77.9% of boys reporting trying smoking (Table 2).

The survey defines current smoking as having smoked cigarettes on at least 1 of the 30 days preceding the survey and defines frequent smoking as smoking on at least 20 of the 30 days preceding the survey. Nationally, approximately one third of students (34.8%) were current smokers and 16.0% were frequent smokers. Louisiana follows the national average with 33.3% and 15.5% of students reporting these behaviors, respectively (Table 2).

Smoking is more common among whites and Hispanics compared with black youth. Frequent smoking is most common among white students. Overall, white and Hispanic students (38.6% and 32.7%, respectively) were significantly more likely than black students (19.7%) to report current cigarette use. White students (20.2%) were significantly more likely than Hispanic and black students (10.4% and 7.0%, respectively) to report frequent cigarette use. This disparity among racial/ethnic groups was identified among both female and male students.

The difference in prevalence of smoking and tobacco use between white and black youth were noted throughout the 1990s (2,3). However, recent data from the National Youth Tobacco Survey (NYTS) (2) suggest that difference may be declining. The NYTS was developed by the Centers for Disease Control and Prevention to supplement the YRBSS by providing more comprehensive data on tobacco use by adolescents. It utilizes identical sampling methods to the YRBSS and is conducted in

Table 1. Tobacco Use by Youth in the United States, Youth Risk Behavior Survey, 1999 (1).

Category	Current Cigarette Use (%)*		Current Frequent Cigarette Use (%)†	
	Male	Female	Male	Female
White	38	39	21	19
Black	22	18	9	5
Hispanic	34	32	13	9
Grade 9	26	29	11	11
Grade 10	34	36	15	15
Grade 11	36	36	20	17
Grade 12	45	41	26	20
Total	35	35	18	16

* smoked cigarettes on ≥ 1 of the 30 days preceding the survey
† smoked cigarettes on ≥ 20 of the 30 days preceding the survey

Table 2. Tobacco Use by Youth in Louisiana. Youth Risk Behavior Survey, 1999 (1).

	Female (%)	Male (%)	Total (%)
Lifetime Cigarette Use*	75.9	77.9	77.0
Lifetime Daily Cigarette Use†	21.9	25.2	23.4
Current Cigarette Use‡	31.8	34.8	33.3
Frequent Use§	15.2	16.0	15.5
Use of >10 Cigarettes/day¶	3.0	5.3	4.1

*Ever tried cigarette smoking, even one or two puffs.
† Ever smoked ≥ 1 cigarettes every day for 30 days.
‡ Smoked cigarettes on ≥ 1 of the 30 days prior to the survey
§ Smoked cigarettes on ≥ 20 of the 30 days prior to the survey
¶ Smoked cigarettes on > 10 cigarettes per day on the the days smoked during the 30 days prior to the survey

all 50 states and the District of Columbia. The 1999 NYTS found that tobacco use among black middle school students was 14.4% versus 11.6% for whites. In high school, tobacco use among blacks was 24.0% versus 39.4% for whites.

Recent Trends

There appears to have been a leveling in smoking and tobacco use among adolescents during the late part of the 1990s (3). Lifetime and current smoking appear to have peaked in 1995-1997 and, perhaps, begun a slow decline since then. The trend is seen across most racial/ethnic groups, genders, and grades.

Similar findings have been reported by the Monitoring The Future study (4), an ongoing study conducted by the University of Michigan under a grant from the National Institutes of Drug Abuse. Annual surveys of 12th grade students have been completed since 1975 and 8th and 10th grade students since 1991. Current smoking among 8th and 10th graders peaked in 1996 at 21% and 30.4%, respectively, and declined to 17.5% and 25.7%, respectively, in 1999. Among 12th graders the decline was minimal, from 36.5% in the peak year of 1997 to 34.6% in 1999. Unfortunately, no similar trend has been seen in the prevalence of frequent smoking.

Reasons for Initiating Tobacco Use

A variety of factors are associated with the initiation of tobacco use by adolescents. As we have seen from the YRBSS, the NYTS, and the Monitoring The Future study, about 12% of middle school students report having tried tobacco (1,2,4). The 1994 Report of the Surgeon General Executive Summary states that, "…use begins primarily in early adolescence…almost all first use occurs before high school graduation" (5). It is this finding that has led to increased efforts to prevent initiation of tobacco use among adolescents. If adolescents can avoid trying tobacco before 18 years of age, it is unlikely they will ever start smoking.

Table 3: Risk Factors for Initiating Tobacco Use

- Sociodemographic
  - Low socioeconomic status
- Environmental
  - Ready accessibility of tobacco products
  - Perception that tobacco use is normative
  - Peer and sibling tobacco use
  - Lack of parental support
- Behavioral
  - Low academic achievement
  - Lack of skills needed to resist influences to use tobacco
  - Experimentation with tobacco
- Personal
  - Low self-image
  - Belief that tobacco use is helpful

Table 4: Stages in Smoking Development

- Preparatory
  - Forming beliefs and knowledge about smoking
- Trying
  - First 2-3 cigarettes
- Experimentation
  - Repeated irregular use
- Regular Use
  - No signs of addiction
- Nicotine Addiction
  - Usually daily use

Sociodemographic, environmental, behavioral, and personal risk factors for initiating tobacco use have been identified (Table 3) (5). Though the advertisement of tobacco products on television has been banned for nearly 30 years, adolescents are still exposed to large amounts of tobacco advertising and promotion. Movies, television, billboard displays, and magazine ads frequently depict smoking, often in a glamorous or exciting way. Actors and models in these depictions are generally attractive and often engage in seemingly healthful activities. This distorts the consequences of tobacco use for impressionable youth. In viewing these depictions uncritically, adolescents may develop misperceptions about the prevalence of smoking among their role models and peers. Especially during early adolescence, such misperceptions are a risk factor for initiating tobacco use, and cigarette advertising may increase the likelihood that adolescents will start smoking. The stages of tobacco use are listed in Table 4.

Nicotine Addiction

Nicotine dependence among adolescent smokers has been demonstrated (5). In a cross-sectional study of 2197 10th grade students in California, Rojas and colleagues showed significant nicotine dependence using a modified Fagerstrom Tolerance Questionnaire (6).

While adolescents begin using tobacco for varied reasons, they continue to use tobacco for the same reason as adults and, similarly, become addicted to nicotine. Nicotine has been designated a highly addictive substance since the 1988 Report of the Surgeon General (7). Adolescents display characteristics of addiction similar to adults. They want to quit smoking but cannot. They see themselves as nonsmokers in the future but continue to smoke. They try to quit, but fail (5).

The frequency and intensity of smoking both correlate directly with adolescents reporting that the reason they smoke is either, "It relaxes or calms me," or "It's really hard to quit" (8). Both statements reflect the addictive nature of nicotine. Symptoms of nicotine withdrawal occur in adolescents and are directly correlated with both frequency and intensity of tobacco use (8). These symptoms include craving tobacco, finding it hard to concentrate, feeling restless or sad, and increased hunger. By increasing the frequency and intensity of tobacco use over time, adolescents demonstrate tolerance to the effects of nicotine. Adolescents and young adults experience multiple failed attempts to quit. They continue to use tobacco despite effects on their health, and they purchase and use tobacco despite legal and social sanctions. These are all characteristics of substance abuse/nicotine dependence according to DSM-IV criteria (9).

Preventing Tobacco Use by Adolescents

Community-based efforts to reduce tobacco use among adolescents have been multidimensional. Increased enforcement of state laws restricts minors' access to tobacco products under penalty of losing federal highway dollars. Some communities have raised taxes on tobacco products, both to directly reduce the purchase of these products by minors and to assist in funding tobacco use reduction efforts. These efforts have met with some success.

In Oregon, a comprehensive community-wide initiative to reduce tobacco use was implemented in 1997. The effectiveness of the school-based program in Oregon was recently reviewed (10). A voter-initiated measure to increase the state cigarette excise tax by 30 cents was used to fund a counter-marketing campaign, a statewide quit line, and competitive grants to community groups and school districts. The school-based program included implementation of tobacco-free school policies, family and community involvement, tobacco prevention curriculum instruction, teacher and staff training, and student tobacco use cessation support. The report concludes that students in schools with funded programs were 20% less likely to smoke than students in nonfunded schools. Smoking prevalence was lowest in schools with high or medium implementation of the program.

Efforts to prevent tobacco use by adolescents must include education to counteract the misconceptions of teens about the harmful effects of tobacco. Children and adolescents see physicians, nurses, and dentists for preventive health care and anticipatory guidance fairly regularly. Sadly, adolescents report they rarely receive information about smoking or tobacco use from these health care providers. In one survey of adolescents, only 25% reported that a health care provider had ever said something to them about smoking cigarettes, and only 12% reported receiving advice about smokeless tobacco. The percentage of affirmative responses did increase with age for cigarette smoking but not for smokeless tobacco. Affirmative responses increased to about 50% among those teens who reported current or prior tobacco use (11).

Helping the Adolescent Smoker Quit

Smoking cessation among adolescents does not differ in principle from adults. A firm commitment to quit is the bedrock upon which successful cessation is built. In a prospective cohort study of 1384 high school students in New Hampshire (12), the authors concluded that the smoking cessation rate among daily smokers of 10 or more cigarettes was comparable to that of adults. Not unexpectedly, they also found that successful smoking cessation was more common in adolescents who smoked fewer than 10 cigarettes per day and among adolescents who had a definite intent to quit.

In an analysis of smoking cessation in 4480 adults in California, the authors concluded that the use of assistance (self-help, counseling,

Table 5: Model for Adolescent Tobacco Use Cessation

- Ask about tobacco use status at every encounter
- Advise about the dangers of tobacco use
  - If not using tobacco, reinforce positive behavior
  - If using tobacco, strongly urge cessation
    - Determine intensity and duration of use
    - Inquire about interest in quitting
- Assist the tobacco user with cessation
  - If not ready to quit, express concern
  - If ready to quit, provide plan
    - Set quit date
    - Discard tobacco products
    - Review previous cessation attempts
    - Consider nicotine replacement therapy
- Arrange follow-up
  - Initial follow-up visit within 2 weeks
  - Subsequent visits as needed

nicotine replacement therapy) was associated with a greater success rate (15.2% versus 7.0%) (13). They found that the use of assistance in smoking cessation increased with age and was higher in heavy smokers, in women, and in whites.

Physicians can assist adolescents with smoking cessation by following the "Five A's" - Ask, Advise, Assist, Arrange Follow-up, and Anticipatory Guidance (Table 5). Physicians should ask about tobacco use at each encounter, and this information should be recorded in the medical record. Physicians can assist by praising adolescents who are not using tobacco and by strongly urging those who are to quit. Ideally, this message should be personalized by linking the tobacco use to a health problem the adolescent is, or is expected, to experience. Queries should be made as to the onset and frequency of tobacco use, the use of tobacco by families and friends, previous attempts at quitting, and the current interest in quitting. Even if the adolescent is not ready to quit, the physician has assisted by raising the adolescent's awareness of the dangers of tobacco and the physician's concern.

If the adolescent is ready to quit, a plan to do so should be developed with the adolescent. This plan should include a firm quit date, preferably within 2 weeks. Family and friends should be informed of the plan and their support be solicited. The adolescent may wish to minimize contact with friends who use tobacco and avoid locations and events where tobacco use is encouraged. All tobacco products should be removed from the adolescent's home, school, and car. Reviewing previous quit attempts may help in anticipating and overcoming barriers to successful cessation. These barriers include fear of weight gain, nicotine withdrawal, dysphoria, and lack of support, particularly from peers.

Total abstinence during the cessation attempt should be encouraged. The use of alcohol will likely prompt a relapse in tobacco use and should be strongly discouraged. Beginning or expanding an exercise program or taking up a new hobby may alleviate the dysphoria often encountered during cessation attempts. This can also enhance the adolescent's self-image and provide the adolescent with a "reason" to quit that can be shared with peer tobacco users. Finally, nicotine replacement therapy can be considered.

Arranging follow-up is an important part of the program. Reviewing the adolescent's success at quitting and the benefits to be derived from cessation can prevent relapse. The successful adolescent should be congratulated and encouraged and advised to remain abstinent. If a lapse has occurred, inquire about problems that prompted the relapse; alternative solutions can be sought. Ask for a recommitment to total abstinence.

Nicotine Replacement Therapy

Nicotine replacement therapy (NRT) is well established as a pivotal part of smoking cessation in adults (14). NRT reduces withdrawal symptoms while the smoker deals with the behavioral aspects of smoking cessation. NRT has doubled the success of smoking cessation programs, especially for heavy smokers. Unfortunately, NRT has not been well studied in adolescents, and none of the current nicotine replacement products are approved for those less than 18 years of age. Nonetheless, NRT may be considered for adolescents addicted to nicotine, especially those who smoke more than 10 cigarettes per day or who have a history of failed prior cessation attempts without NRT.

NRT is meant to be a short-term aid in smoking cessation. It should not be used for longer than 3 months, and persons using NRT are encouraged to stop smoking completely. NRT is available in several forms: gum (nicotine polacrilex), transdermal patch, nasal spray, and inhaler. There are scant data on the safety and efficacy of NRT in adolescents in the literature. A nonrandomized, unblended study of nicotine patch therapy in 22 Minnesota high school students concluded that nicotine patch therapy seemed safe and well tolerated (15). Mild skin reactions, nausea, fatigue, and dizziness were the most commonly noted adverse events. I am aware of no published reports concerning the use of nicotine gum, nasal spray, or inhalers in adolescents.

Nicotine transdermal patches are available over-the-counter in various dosages of nicotine (7 mg, 14 mg, 15 mg, and 21 mg) delivered per day (16). A new patch should be applied every 24 hours to nonhairy, clean, dry, skin on the upper body or upper outer arm. To minimize skin reactions, the site should be rotated each day. For adult, heavy smokers, the usual starting

dose is 21 mg/d for 4-8 weeks. This may be tapered every 2-4 weeks thereafter for a total of up to 12 weeks. For patients less than 100 pounds, or who smoke fewer than 10 cigarettes per day, or who have a history of cardiovascular disease, a lower starting dose of 14-15 mg/d for 4-8 weeks followed by 7 mg/d for 2-4 weeks should be used. Given the paucity of data, this lower starting dose is advisable for adolescents as well.

Summary

Adolescence is a prime time for the initiation of smoking and tobacco use. Adolescents initially try and experiment with tobacco for a variety of psychosocial reasons. They quickly become addicted to nicotine, smoke regularly if not heavily, and suffer short- and long-term effects of smoking. Preventing youth tobacco use requires a community-wide effort of education, counseling, and support. Once addicted, adolescents find it hard to quit smoking and experience nicotine withdrawal effects. A combination of counseling, peer and family support, and, for some, NRT, is the best approach to tobacco cessation.

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