

# The Pediatrician's Role in Reducing Tobacco Exposure in Children

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**ABSTRACT.** *Objective.* Pediatricians have a unique and important role to play in the prevention and treatment of childhood and adolescent tobacco use, the protection of patients from the harmful effects of environmental tobacco smoke, and the encouragement of smoking cessation among parents. However, because recent research indicates that physician training in tobacco dependence is woefully weak and lacks a model for training, this article constructs a useful approach to this problem.

*Methodology.* A comprehensive review of the literature served as the basis for the development of a new model for pediatrician training in tobacco dependence.

*Results.* A comprehensive model is presented for training pediatricians in the areas of reducing infant and child exposure to environmental tobacco smoke, preventing youth smoking initiation, and providing smoking cessation assistance for adolescents and parents.

*Conclusions.* Pediatricians have been called on to play an active role in the antitobacco arena. Because of their unique opportunity to interact with children, adolescents, and parents, pediatricians can and should be antitobacco interventionists. For this to occur, however, additional guidance should be provided to pediatricians during their training to better prepare them to carry out effective assessment and intervention practices. *Pediatrics* 2000;106(5). URL: <http://www.pediatrics.org/cgi/content/full/106/5/e66>; *smoking initiation, smoking prevention, smoking cessation, environmental tobacco smoke, pediatricians.*

ABBREVIATIONS. SIDS, sudden infant death syndrome; ETS, environmental tobacco smoke; MI, motivational interviewing; BMT, basic military training.

Cigarette smoking and other forms of tobacco exposure are the leading preventable causes of morbidity and mortality in our society and among the most important public health problems of our time.<sup>1-3</sup> Tens of thousands of studies document the causal role of tobacco in cardiovascular disease, lung and other cancers, and chronic obstructive lung disease, which constitute 3 of the leading causes of

death and disability in the United States.<sup>3-5</sup> Worldwide, it is estimated that each year ½ billion people will die prematurely from tobacco exposure.<sup>6</sup>

More than 90% of all individuals who ever smoked and 70% of all regular smokers initiated smoking before 18 years of age.<sup>7</sup> If people do not start smoking in their youth, few would smoke as adults.<sup>7</sup> Despite this, success in preventing smoking onset in young people has been mixed. Smoking prevalence among adolescents decreased sharply in the 1970s; however, the decline plateaued in the 1980s.<sup>7</sup> Recent data from the 1997 Youth Risk Behavior Survey suggest that youth smoking rates are increasing. The prevalence of smoking among high school seniors increased from 27.5% in 1991 to 36.4% in 1997.<sup>8</sup> The increase in youth smoking during the 1990s was particularly striking among ethnic minority groups; with an increase of 80% among blacks.<sup>8</sup> More than 3000 young people begin to smoke each day,<sup>9</sup> and >50% of these new smokers will smoke for at least 16 years.<sup>10</sup>

Although many of the adverse health effects of cigarette smoking and other forms of tobacco use occur later in life, smoking has been termed a pediatric disease.<sup>7,11</sup> Cigarette smoking and other forms of tobacco exposure adversely affect the health of children and adolescents and set the stage for illness and addiction in adulthood. Recent findings suggest that smoking during adolescence may cause genetic changes that lead to lung cancer among former smokers later in life.<sup>12</sup> Adverse health effects often observed in very young children include those primarily caused by environmental tobacco exposure, such as attenuated lung growth, shortness of breath, exacerbation of asthma, respiratory distress, increased incidence of ear infection, and increased risk of sudden infant death syndrome (SIDS). Those seen as a direct result of tobacco use in older children are lowered physical fitness, addiction to nicotine, increased health care utilization, and risk of serious tobacco-related disease as an adult.<sup>7</sup> Cigarette smoking also is an important gateway drug. Tobacco is generally the first drug used by youths who subsequently abuse other substances.<sup>7</sup> Adolescents who smoke are 3 times more likely to use alcohol, 8 times more likely to use marijuana, and 22 times more likely to use cocaine than are their nonsmoking peers.<sup>7</sup>

Pediatricians may play a leadership role in protecting young people from environmental tobacco smoke (ETS), preventing smoking onset, and helping youths and their parents quit smoking.<sup>13-16</sup> Most

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children attend a minimum of 20 physician office visits before 21 years of age,<sup>14</sup> and they rank pediatricians as very influential in terms of their health practices.<sup>14</sup> Adolescents often attend more to the health advice from pediatricians than from parents or other adults.<sup>7</sup> In a series of focus groups with youths, young smokers listed 3 factors that would motivate them to try to stop smoking: 1) the tobacco-related death or illness of a close relative, 2) a request from their boyfriend or girlfriend, and 3) advice from their doctor.<sup>17</sup>

Despite this, many pediatricians do not regularly address tobacco.<sup>18</sup> In a survey of New Jersey pediatricians, Hymowitz<sup>19</sup> found that only 56% asked patients about tobacco use, and fewer still (34%) offered to help patients who smoke to stop smoking. Parental smoking is an important source of ETS and a potent influence on smoking initiation in children.<sup>11</sup> However, Frankowski and Secker-Walker<sup>20</sup> found that only 40% of a sample of New England parents who smoke indicated that their child's pediatrician talked to them about the adverse effects of their smoking on their child's health. The pediatrician's silence may be construed as a lack of concern or tacit approval of smoking by the parent.

The lack of attention paid to smoking cessation on the part of pediatricians may stem from a broader deficit in preparation of physicians during medical school to deliver cessation messages. A recent study in the *Journal of the American Medical Association* revealed that a majority of medical schools have not incorporated into their curricula smoking cessation guidelines outlined in the 1996 Agency for Health Care Policy and Research and the National Cancer Institute Expert Panel. Although medical school seems to be the ideal time for training in smoking cessation,<sup>21</sup> Ferry et al<sup>22</sup> found that over one half of the US medical schools that they surveyed spent 5 or fewer hours on smoking cessation instruction across the entire 4-year span of training.

This review addresses 3 ways in which pediatric intervention may have a significant impact on tobacco use and exposure in young people: 1) reducing exposure to ETS, including facilitation of parental smoking cessation, 2) preventing smoking initiation, and 3) providing smoking cessation services for adolescents.

## REDUCING ETS EXPOSURE

### Health Effects of ETS on Children

Adverse health effects of ETS in children include increased lower respiratory infection; increased respiratory symptoms; reduced lung growth; exacerbation of asthma; irritation of the eyes, nose, and throat, and lower respiratory tract; increased risk for middle-ear disease; and increased risk of SIDS.<sup>23,24</sup> Each year, ETS is responsible for between 7500 and 15 000 childhood hospitalizations.<sup>25</sup> Despite these and other significant negative health effects, approximately one half of the children in the United States below 5 years of age are exposed to tobacco smoke, with exposure beginning before birth for nearly one quarter of them.<sup>23</sup>

ETS is also an important risk factor for mortality. Infants of parents who smoke have higher mortality rates throughout the first year of life than do infants of nonsmoking parents,<sup>3</sup> primarily because of the contribution of ETS to SIDS and other respiratory illnesses.<sup>23</sup> Overall, there is a dose-response relationship between the number of cigarettes smoked in the household and the frequency of physician visits, emergency department visits, and hospitalizations.<sup>26,27</sup>

Maternal smoking in the home is an important cause of ETS exposure in children.<sup>28,29</sup> Greenberg and colleagues<sup>30</sup> reported that mothers are typically the primary source of ETS exposure for children, with rates of exposure from nonfamilial individuals directly associated with the amount smoked by the mother. Mascola and colleagues<sup>31</sup> also found that the urine cotinine levels of breastfeeding infants of mothers who smoked were significantly higher than were levels found in infants of nonsmoking mothers, and the absolute levels of cotinine found in the infants of smoking mothers revealed a much higher degree of exposure through breast milk than had previously been considered. However, it is important to note that inhalation of smoke from other smokers in the home<sup>31</sup> as well as various food products<sup>30</sup> may cause similar elevation of urine cotinine in children. Thus, inhalation of tobacco smoke produced by others aside from the mother should also be assessed at every visit. Moreover, although the home may remain the primary source of exposure to tobacco smoke, nonsmokers who live with a smoker may also have greater ETS exposure outside of the home than do nonsmokers who live with nonsmokers.<sup>32</sup>

### The Pediatrician's Role in Reducing ETS Exposure Among Children

Office/clinic visits provide excellent teachable moments for pediatricians to encourage parents to provide a smoke-free environment for their children. Although the American Academy of Pediatrics advocates a strong role for physicians in promoting smoke-free environments for children and adolescents,<sup>33</sup> a survey of parents in a pediatric clinic at a major urban hospital in New Jersey showed that only 21% of parents from a household with at least 1 smoker and 34% of parents who currently smoke reported that their child's pediatrician talked with them about ETS.<sup>34</sup> Even fewer parents reported that the pediatrician offered to help them stop exposing their children to ETS. These findings are particularly distressing because 55% of the children 1 year of age or less who attended the clinic lived in a household with at least 1 smoker. Pediatricians regularly talk with parents about nutrition, lead poisoning, and other child health and safety issues. Advice and assistance in the management of ETS similarly may result in significant reductions in tobacco-related illness.

Pediatricians may take advantage of the recommended series of 12 well-child visits during the first 6 years of life, as well as additional office visits for treatment of illnesses, to ask about ETS exposure and

to provide information on the dangers of smoking and ETS to parents.<sup>33</sup> During each regular visit, as well as during sick child visits, pediatricians should assess the extent of ETS experienced by their young patients. Assessment of ETS involves asking the parent (or older patient) whether either parent smokes, the extent of smoke exposure from relatives, day care, other activities, and for older children, from friends or peers, and whether any steps have been taken to reduce ETS in the child's surroundings. Physicians should bear in mind, however, that an individual's assessment of exposure levels, particularly as measured by questionnaires providing global exposure ratings, may consistently underestimate actual exposure.<sup>32</sup> An alternative would be to measure urine or saliva cotinine, a metabolite of nicotine, in infants and children.<sup>28,35</sup> Not only are urine and saliva cotinine important biomarkers for ETS exposure, they may serve as motivation and intervention tools to promote healthy environments. However, the pediatrician should bear in mind that cotinine is a short-term marker of exposure that is easily affected by the level of exposure and metabolic rate.<sup>36</sup>

The evidence from randomized, control trials investigating clinical interventions for the reduction of ETS exposure is mixed. Wahlgren and colleagues<sup>37</sup> report significant differences among behavioral counseling, self-monitoring, and medical care as usual groups with regard to decreases in exposure of asthmatic child patients to ETS. Specifically, these researchers reported a 79% reduction in ETS exposure in the behavioral-counseling treatment group; a rate nearly twice that of the control groups. This difference was maintained at a 2-year follow-up. Wahlgren and colleagues<sup>37</sup> also reported that printed materials distributed to all groups 12 months into the study resulted in further decreases in ETS exposure among the counseling group and the control groups. Finally, despite being told that they were not being asked to quit or reduce their rate of smoking, the quit rate for the treatment group was nearly 22%, while the rate for the control group was just under 4%.

Unfortunately, most of the remaining studies suggest that interventions on ETS produce modest results at best. In a study by Greenberg et al,<sup>38</sup> nurses made four 45-minute home visits over a 6-month period to treatment group mothers. Visits included education about ETS and the detrimental health effects, identification of sources of ETS, development of a plan to reduce ETS exposure, and reinforcement for steps taken toward ETS reduction. Overall, infants in the treatment group were exposed to 5.9 fewer cigarettes per day at 12 months than were infants in the control group. Although there were no differences in the rate of active smoking among parents at the follow-up, there was some evidence of decreases in persistent lower respiratory symptoms among the intervention group.

Two additional studies assessed the impact of interventions on ETS exposure among infants via urine cotinine.<sup>36,39</sup> Chilmonczyk and colleagues<sup>36</sup> randomly assigned infants with mothers who reportedly smoked 10 or more cigarettes per day into either

an intervention group that received a phone call counseling them about ETS and a follow-up letter or into a control group. Results indicated that differences between the intervention and control groups were not statistically significant. Woodward et al<sup>39</sup> randomly assigned women who had just delivered an infant to an intervention consisting of a written health education kit provided in the hospital followed by a phone call 1 month later or to a control group. Results demonstrated no statistically significant effect for the intervention, although there was a reduction in maternal smoking associated with contact with the research staff.

Finally, a study by Irvine et al<sup>40</sup> examining exposure to ETS among asthmatic children in Scotland also failed to produce significant effects for a counseling intervention. Subjects for this study were families identified through the health care system as having an asthmatic child and at least 1 parent who smokes. After contact with the families was established, in an effort to decrease rates of ETS exposure, a research nurse visited the intervention group families. Parents in this group were counseled regarding passive smoking, the detrimental health effects of ETS, particularly for children with asthma, the financial and health benefits of smoking cessation and decreased exposure to ETS, and a strong message to quit smoking along with cessation strategies. Results from this study indicate that the brief intervention was ineffective in decreasing ETS in the treatment group. In fact, it seems that the unsolicited counseling may have actually resulted in lower quit rates for the intervention group.

In all, although there seems to be a lack of consistent positive findings in this area, a few variables seem related to success. For instance, in the most successful study, behavioral counseling took place over 6 months in the clinic setting involving physician prompting to emphasize the message with a group of children whose reactions to ETS could be easily identified. Conversely, variables associated with a less effective outcome include intervening at the maternity ward or at home with mothers of newborn infants. In addition, approaching and intervening on individuals out of the blue does not seem to be effective. However, another characteristic most ineffective studies have in common is a relatively low amount of contact with a health care professional. Finally, sending a strong message to quit to individuals who may not be ready to stop smoking seems to be not only ineffective but perhaps iatrogenic.

Overall, the number of well-designed, randomized, controlled intervention trials examining ETS reduction is alarmingly low considering the price paid by children growing up around smokers. In addition, these studies reveal the necessity of carrying out interventions during teachable moments in the clinic setting. Thus, the physician with the greatest amount of contact with children—pediatricians—should naturally be involved. There is a great opportunity and, indeed, a great need to accomplish this task.

Effective ETS messages by pediatricians should include several components (Table 1). First, parents

**TABLE 1.** Strategies for Reducing ETS Exposure Among Children

Initial ETS interventions
Identify sources of ETS exposure for the child.
Provide general information regarding the negative health effects of ETS.
Review strategies and potential barriers for reducing the child's exposure to ETS.
Suggest that parents discuss strategies to reduce the child's ETS exposure with other caretakers.
Interventions at follow-up visits
Further identify sources of ETS exposure, reinforce possible reductions brought about by the parents, and problem-solve barriers encountered in their endeavors.
Provide additional information about the health consequences of ETS.
Assess parental smoking cessation efforts.

should be taught methods for identifying ETS sources in the child's environment. Common sources of ETS include parental smoking, smoking by grandparents and other caretakers, smoking in automobiles, and tobacco smoke in day care and schools. Second, parents should receive information on the adverse effects of ETS and the benefits of growing up in a tobacco-free environment. Pediatricians should take advantage of this clinical opportunity to personalize the health message, perhaps relating the child's respiratory distress or history of repeated ear infections to parental smoking and ETS exposure. Next, the pediatrician should engage parents in a detailed discussion of ways in which they can reduce tobacco smoke in their child's environment.<sup>41</sup> It is often helpful to use open-ended questions and other features of motivational interviewing (MI)<sup>42</sup> to engage the parent in a productive discussion. Some examples of open-ended questions are: What are your thoughts about the relationship between your smoking and your son's asthma attacks?; What kinds of things can you do to reduce his exposure to ETS?; What problems will you encounter by creating a smoke-free household?; and How will you cope with them? Parents should also be encouraged to share information and discuss ETS reduction strategies with the child's other caretakers.

During subsequent office visits, pediatricians should follow up by talking with parents, reinforcing positive changes, and encouraging additional steps to protect their child's health. Follow-up messages should include: 1) identification of additional sources of ETS exposure, 2) a discussion of potential barriers to change and ways of overcoming them, and 3) a plan of action developed jointly by the doctor and the parent. This plan of action may also include discussion pertaining to parental smoking cessation. For parents who did not take the necessary steps to protect their child from ETS, additional discussion of the adverse effects of ETS on the child's health may be in order. It may also be useful to explore with the parents the costs and benefits of creating, and of not creating, a smoke-free environment for their child (decision balance).<sup>42</sup>

After training physicians in an office-based smoking intervention program, Kligman and Narce-Valente<sup>41</sup> found significant increases in screening for

ETS and counseling of parents who smoke. Data from a Canadian study suggest that physician efforts to deter parents of asthmatic children from exposing their children to tobacco smoke reduced the children's exposure to cigarettes and led to less severe asthma symptoms.<sup>43</sup>

One reason why pediatricians are not more active in addressing ETS and tobacco in general may be the lack of preparation during their residency training. Hymowitz and colleagues<sup>34</sup> initiated a study of the efficacy of training pediatric residents to intervene on ETS, as well as other aspects of tobacco use. A survey of parents whose children attend a continuity clinic run by the residents showed that the percentage of parents who reported that the resident intervened on ETS increased from 34% at baseline to 65% at year 1 of follow-up. The training program is continuing, and additional surveys will be conducted to determine whether graduates of the training program continue to address tobacco when they enter clinical practice. In view of the important role that pediatricians may play in protecting young people from ETS, more consideration must go into preparing the next generation of pediatricians to meet this responsibility.

Studies of pediatric interventions to promote parental smoking cessation also are warranted. Given that parental smoking is the principal source of ETS exposure among children,<sup>25,44,45</sup> we discuss the potential role of pediatricians in parental cessation below.

#### The Pediatrician's Role in Parental Smoking Cessation

Former Surgeon General, C. Everett Koop, stated that "one of the pediatrician's most important educational obligations is to help and encourage parents to give up smoking."<sup>46</sup> Recent surveys suggest that most parents agree. Frankowski et al<sup>47</sup> found that over one half of all parents surveyed (56%) agreed that it is the pediatrician's job to advise parents to quit smoking. In the same study, 52% of current smokers indicated that they would welcome such advice.

Pediatricians are the health care professional with whom healthy 18- to 35-year-old parents have the most contact.<sup>13,48</sup> Given the harmful effects parental smoking has on children's health, parent's receptiveness to smoking cessation advice and assistance, and pediatricians' access to parents, pediatricians may play an important role in reducing the prevalence of smoking among a large segment of the adult population—parents.

Brief physician interventions for smoking cessation are typically well-received by patients,<sup>49</sup> and they may have a significant and positive impact on parents who smoke.<sup>50</sup> Wall and colleagues<sup>51</sup> reported that new mothers who received literature about ETS and a letter advising them to quit smoking, as well as written and oral advice during 4 subsequent well-baby visits, demonstrated significantly higher cessation rates and significantly lower relapse rates (5.9% and 45%, respectively) than did mothers receiving the initial literature alone (2.7% and 55%, respectively). In another study, individuals

seeking pediatric services from a publicly funded pediatric clinic were given a basic cessation message along with a self-help guide presented by community health nurses. The reported point prevalence quit rate at 1-year follow-up for this minimal contact intervention was 12.5%.<sup>52</sup> The rate of abstinence for 90 or more days was 9.1% subsequent to the intervention, compared with only 5.2% before the intervention.

The National Cancer Institute<sup>53</sup> outlined an approach to brief office-based smoking cessation treatment for adults, often referred to as the 4-A model (Ask, Advise, Assist, Arrange Follow-Up). The 4-A model of smoking cessation is summarized in Table 2 and described below.

*Ask About Smoking at Every Opportunity*

The first step is asking parents during every visit whether they smoke and documenting their smoking status. Not only does this repeated line of questioning provide the physician with information necessary to adequately treat the parent (or adolescent, as discussed below), it reinforces the physician's negative view of smoking.

*Advise the Parent to Stop Smoking*

The pediatrician should strongly advise parents to stop smoking. Linking smoking cessation to both parents' and children's health may motivate parents to quit. Asking about smoking status and advising cessation sends a clear message to the parent and may set the stage for treatment planning.

Before proceeding further, it is often useful to assess the parent's readiness to quit smoking.<sup>54</sup> The transtheoretical model of change suggests that quitting smoking is a process rather than an all or nothing phenomenon, and most smokers go through the process of quitting many times before they finally succeed. Although the transtheoretical model has produced some mixed results in terms of its ability to predict smoking cessation,<sup>55,56</sup> we believe that it remains a useful heuristic for designing smoking ces-

sation interventions<sup>57-59</sup> (see Pierce et al<sup>60</sup> for an alternative model of smoking behavior change). For instance, stage of change was a significant predictor of smoking cessation in a recent large population-based study in young adults.<sup>61</sup>

The physician should determine the parent's stage of readiness for change and offer an intervention that is appropriate for that specific stage. The various stages of change for smokers are: precontemplation, a stage in which the smoker is not thinking about quitting and has no intention of quitting smoking within the next 6 months; contemplation, a stage in which the smoker is thinking about quitting, perhaps in the next 6 months, but has not taken any steps toward quitting; preparation, the stage in which the smoker is planning to quit within 1 month; action, the stage in which the smoker has successfully quit smoking for at least 24 hours; and finally, maintenance, a stage in which the smoker has quit smoking for at least 6 months. Many smokers who reach the action or maintenance stages succeed for a while, only to return to smoking when they least expect it. They must recycle through the stages of change, hopefully learning from past mistakes.

Assessing a parent's stage of change (ie, readiness to quit) can be completed easily and quickly through the use of a short interview, open-ended questions (eg, What are your thoughts about quitting smoking?; How will you go about quitting?; and, By what date would you like to be tobacco free?), and/or questionnaire. Stage-appropriate advice may help parents advance from one stage of readiness to the next.<sup>62,63</sup> Parents in the precontemplation or contemplation stages may benefit from information and discussion about the health effects of smoking and the costs and benefits of continuing to smoke. They may be given material to read or invited to view a film on the health hazards of smoking and ETS in the waiting room (see the "Appendix"). Their interest in quitting should be reassessed at a subsequent visit. If, at a subsequent visit, they have moved from one stage to the next (ie, a parent in the precontemplation stage is now thinking about quitting), the encounter should be classified as a successful one. Note that successful encounters need not necessarily end in smoking cessation.

Those in preparation or action may benefit most from guidance on how to quit and how to remain abstinent. They may use self-help behavioral materials to prepare for a quit date and perhaps medication to minimize withdrawal symptoms (see below). Parents in maintenance benefit from support for remaining cigarette-free and suggestions for coping with obstacles to success. For instance, the pediatrician is likely to see many new parents who quit smoking during pregnancy.<sup>64</sup> After the infant is born, they are at risk of returning to smoking,<sup>65</sup> and they may benefit greatly from the pediatrician's interest, support, and assistance.<sup>66</sup>

Movement from a stage in which a smoker is not ready to quit to a stage in which he/she is ready may be the best predictor of a person's ability to quit smoking.<sup>67</sup> Asking and advising have been shown to be particularly helpful in moving patients from the

**TABLE 2.** The National Cancer Institute's 4-A Approach to Physician-Based Smoking Cessation

Ask parents about smoking at every opportunity	I've noticed that your daughter has had a large number of respiratory problems, do you or your spouse smoke cigarettes?
How many cigarettes do you smoke each day?	
Advise parents to stop smoking	As your child's pediatrician, I must advise you to stop smoking, both for your own health and your son's.
One of the best ways for you to help your daughter is to quit smoking.	
Are you willing to attempt to quit smoking?	
Assist the parent in quitting	Let's set a quit date in the next couple of weeks.
Here are some materials from the National Cancer Institute that many smokers have found helpful.	
Let's talk about some medications that might help you to quit.	
Arrange follow-up visits with the parent	I'd like us to arrange an appointment a week after your quit day.
My nurse will be calling you next week to ask you about your quit day.	

precontemplation and contemplation stages to the preparation stage.<sup>68</sup> If the parent is not ready to quit, advice from a physician can be an effective motivator. Information about the health effects of smoking on the child as well as the parent (including discussion and handouts), discussion of the costs and benefits of quitting or continuing to smoke, and building the patient's self-efficacy by pointing out his/her new found knowledge and understanding of why and how to quit may move the smoker along the continuum of change. Law and Tang<sup>69</sup> found that physician counseling during routine visits was responsible for 2% of quitting by patients who smoke. Although cessation rates may be modest, physician counseling is time- and cost-effective,<sup>63</sup> and, because physicians see large numbers of smokers each year, even modest quit rates may yield a significant positive public health impact.

#### *Assist the Patient in Quitting Smoking*

Once parents are motivated to quit smoking, it is incumbent on physicians to assist them. The first step is to inquire about past quit attempts. What worked and what did not? What problems did they encounter, and how did they cope? Did they experience withdrawal symptoms, and what might they do differently next time? If they were burdened by cravings, irritability, and weight gain in the past, they may be a good candidate for nicotine replacement therapy or bupropion hydrochloride.<sup>50</sup> Stress management techniques, information on low-calorie snacking, and modest exercise also may be recommended where appropriate. The physician should join with the parent in developing a treatment plan, making available self-help manuals that provide a variety of behavioral suggestions for modifying smoking and preparing for quitting.<sup>50</sup>

Smokers should be encouraged to work toward a quit date, ideally within ~2 weeks of the visit. In preparation for quitting, smokers typically learn about why they smoke, become aware of factors that control their smoking, practice modifying their smoking one step at a time, and acquire alternative ways of coping with stress and other factors that influence their tendency to light up.<sup>50</sup> The physician may encourage the smoker to inform their family, friends, and coworkers about their cessation plans so they may elicit necessary support and encouragement. If nicotine replacement therapy is recommended, the product should be purchased ahead of time so that it is available for use on the quit day. Bupropion hydrochloride therapy, in contrast, must be initiated ~2 weeks before the quit date, so that adequate levels of bupropion hydrochloride build up in the blood stream.<sup>70</sup>

#### *Arrange Follow-Up*

Kennedy<sup>71</sup> reported that increasing levels of positive reinforcement for cessation attempts is associated with higher cessation rates. The physician can promote successful quit attempts through the use of follow-up contacts via telephone, post cards, and office appointments. Soon after, or on the parent's scheduled quit date, the physician should arrange for

office staff to call the parent to support their quit attempt.

Most smokers who quit relapse (return to smoking) within 6 months,<sup>72</sup> and as much effort should be devoted to long-term nonsmoking maintenance as to initial cessation. Many of the same skills used to quit smoking may be used to remain cigarette-free.<sup>50</sup> Quitters also may be advised to go to the dentist to get their teeth cleaned, purchase an item on credit and pay for it with money not spent on cigarettes, continue to exercise and watch their weight, and use nicotine replacement products or bupropion hydrochloride as recommended. Office personnel should reestablish phone contact with the parent within a month after the quit date. Subsequent office visits should be used to reinforce and support the parent, to plan ahead for challenging situations, and to work out ways of coping with obstacles to success. The strategies involved in assisting cessation and arranging follow-up facilitate the shift from the preparation stage into the action and maintenance stages.<sup>68,73-76</sup>

#### *Harm Reduction*

If smoking cessation is not achievable, encouraging restrictions on when and where household members may smoke may be the only option for reducing the health consequences of ETS. Severson et al<sup>77</sup> reported that many mothers were more confident about smoking outside the home and restricting visitors' smoke in the house than about quitting. Although McIntosh et al<sup>78</sup> found that restricting smoking to outside the home wasn't necessarily an easier behavioral goal to implement than was cessation, physicians should be trained in both interventions.<sup>78</sup> It should be noted, however, that restricting smoking to a designated location in the home may result in only negligible decreases in ETS exposure.<sup>31</sup>

In many cases, mothers and others will report that it is not possible for them to leave the house to smoke. Women do not want to leave the infant or child alone in the house, and others simply do not want to go outside in the cold or rain. Nicotine replacement products, such as the nicotine gum, nasal spray, or inhalers,<sup>70</sup> may prove helpful. Rather than smoking in the house and exposing the infant or child to ETS, the parent/family member may be encouraged to use nicotine replacement until it is more convenient for them to smoke outside. In this case, the nicotine replacement products may enable the parent/family member to maintain a smoke-free household without quitting smoking. In the future, they may decide to make greater use of the product to quit smoking altogether.

#### **PREVENTION OF SMOKING INITIATION**

Pediatricians can play an important role in the prevention of smoking initiation among children and adolescents. Advice to refrain from tobacco use not only serves as a potent intervention, but it also bolsters antismoking messages from parents and schools. However, to prevent smoking onset, pediatricians should be aware of risk factors for smoking initiation and effective prevention strategies.

### Patterns of Onset

Flay<sup>79</sup> identified a sequence of 5 distinct stages in which young people progress from trying a cigarette to the acquisition of dependence or addiction. They are: preparation stage, which involves the formation of knowledge, beliefs, and expectations about nicotine use and the functions it can serve (ie, definition of self as glamorous, mature, independent, etc); initial trying, which covers the first 2 or 3 attempts to smoke, usually in the company of friends; experimentation involves irregular use over an extended period, often several years; regular use, in which youth use tobacco on a regular basis (ie, on weekends, on the way to school, after school, etc); and nicotine dependence or addiction, which features the development of an internally regulated need for nicotine. It is estimated that approximately one third of adult nicotine users were addicted before the end of high school.<sup>79</sup>

### Risk Factors for Smoking Initiation in Children and Adolescents

Research over the past 2 decades has revealed important risk factors for smoking initiation.<sup>80</sup> Table 3 lists several risk factors that can be easily and quickly assessed during a typical pediatric visit. Although every child ought to receive a smoking prevention intervention, those who are at highest risk for tobacco use should receive the highest priority.

#### Demographic Risk Factors

Data from the Centers for Disease Control and Prevention<sup>7</sup> suggest that over 14% of children experiment with cigarettes before 12 years of age. Among individuals who become regular smokers, ~62% started smoking before 16 years of age.<sup>7</sup> In a study of young smokers entering military service, Haddock et al<sup>81</sup> found that 4.1% of smokers began smoking before 10 years of age. Even very young patients should be considered at risk for tobacco use. Pediatricians should be particularly attentive to children during the transition from elementary school to junior high or middle school—the time when they are most vulnerable to smoking initiation.<sup>7</sup>

Men are more likely to use tobacco products than are women.<sup>7,81,82</sup> Smokeless tobacco use is nearly entirely a male problem, with <10% of smokeless

tobacco users being female.<sup>83</sup> Although the prevalence of smoking has been substantially reduced in males, the prevalence among females has remained relatively stable.<sup>7</sup> In the 1995 National Household Survey on Drug Abuse, the prevalence of smoking was the same for males and females 12 to 17 years of age.<sup>83</sup> Many of the risk factors for smoking are similar for both genders (eg, influence of parents and friends); however, there seem to be some gender-specific risks for tobacco use.<sup>7,82,84</sup> While males who smoke are less socially skilled than their nonsmoking counterparts, the opposite relationship holds for females.<sup>7</sup> Females also are more likely than males to initiate smoking for weight control.<sup>85–88</sup>

#### Environmental Factors

Smoking by family members and peers enhances the risk of smoking onset in youths.<sup>7,16,81,89</sup> Perry and Silvis<sup>16</sup> noted that parents reinforce beliefs about smoking that are likely to be adopted by their children. Parental smoking may cause children to view smoking as an acceptable adult behavior that is engaged in by those they most admire. Children also may learn about the functional value of cigarettes from their parents. When parents smoke to cope with stress, relieve boredom, or facilitate social interaction, they send a powerful message to their children. Pediatricians should be sensitive to the importance of family dynamics, with regard to the likelihood of subsequent development of tobacco use in children.

Peer influence has been called the single most important risk factor for smoking initiation.<sup>7,16</sup> Having a best friend who smokes predicts initial smoking attempts, while having a large percentage of friends who smoke is predictive of continued smoking.<sup>90</sup> The pediatrician should routinely ask young people about their friends' smoking behavior.

#### Behavioral Factors

Children who perform poorly in school, as measured by grades, attendance, and employment aspirations, are at increased risk for smoking initiation.<sup>7</sup> Haddock and colleagues<sup>81</sup> examined both educational attainment (on a scale from less than high school to graduate training) and smoking status in a population of military trainees. They found that for each increase in educational attainment, trainees were 37% less likely to be a smoker. The predictive ability of academic achievement is so impressive that Newcomb and colleagues<sup>91</sup> suggested that a youth's academic achievement and aspirations are principal influences on adolescent smoking behavior.

Cigarette smoking covaries with other problem behaviors, such as alcohol abuse, low physical activity level, poor diet, and deviance.<sup>7,81,92–95</sup> In a sample of college students, Hines and colleagues<sup>94</sup> found that smokers were 1.6 times more likely to engage in sexual intercourse with someone they had just met, 1.8 time more likely to have sex with a stranger while intoxicated, 3.7 times more likely to report using illegal drugs, and 4 times more likely to be arrested for drunk driving. Similarly, Simon and colleagues<sup>96</sup> found that initiation of tobacco use was associated with alcohol use, risk taking, and low self-esteem in

**TABLE 3.** Risk Factors for Smoking Initiation

Demographic factors
Ages 10 to 18 y
Male gender
Environmental factors
Having a parent(s) who smokes
Belonging to a peer group who use tobacco
Behavioral factors
Poor academic achievement
Having other behavioral problems
Experimentation with tobacco use
Personal factors
Viewing smoking as socially beneficial
Overestimation of the prevalence of smoking
Risk taking and rebelliousness
Psychological well-being

Adapted from USDHHS, 1994.

a large group of adolescents. Children who demonstrate disordered conduct should be considered at high risk for tobacco use.

Pediatricians should be particularly sensitive to patients who experiment with tobacco because any tobacco use is associated with a higher likelihood of smoking initiation.<sup>7</sup> Approximately one third to one half of individuals who experiment with tobacco become regular smokers.<sup>97</sup> Teens should be made aware of this and asked to define a personal limit above which they would be concerned that their own experimentation was becoming an addiction. Whether an individual graduates from smoking experimentation to nicotine dependence may be linked to constitutional differences in nicotine sensitivity.<sup>98</sup> However, because the specific physiologic susceptibility to smoke has not been determined, all children should be considered vulnerable to nicotine dependence. The high prevalence of subsequent regular smoking among adolescents who experiment with tobacco emphasizes the importance of preventing all experimental tobacco use.<sup>7</sup>

#### *Personal Factors*

In a study comparing smoking and nonsmoking military recruits, Haddock and colleagues<sup>81</sup> asked participants to rate their agreement with the statement "Despite what people say, there's a lot about smoking that is attractive to me" on a 5-point scale, from strongly agree to strongly disagree. For each unit increase in a recruit's level of agreement, they were 3.6 times more likely to be a smoker. At-risk youth often assume that the overall consequences of smoking are positive rather than negative. Those who believe that smoking makes them look more mature, increases their social status, or helps them cope with stress are at higher risk for smoking experimentation and initiation.<sup>7</sup>

Children at risk of smoking often overestimate the prevalence of smoking among their peers.<sup>90,99</sup> Children who later smoke are more likely to overestimate both peer and adult smoking rates,<sup>7</sup> possibly because of the relatively large number of smokers in their social environment. Similarly, they may also view smoking as a normative behavior that has wide social acceptance. Strategies designed to alter distorted perceptions typically are an important component of adolescent smoking prevention programs.<sup>100</sup> However, it is difficult to determine whether adolescents who overestimate prevalence are more apt to surround themselves with smokers, because of, perhaps, a higher level of acceptance of smoking, or whether this groups' estimation is biased because they are surrounded by a high number of smokers. Regardless, pediatricians should ask children to estimate the prevalence of smoking among their peers. If the patient overestimates the prevalence of smoking, the pediatrician should take note and devote some time to corrective action (ie, discuss potential reasons for the overestimation, such as advertising, smoking in movies, and peer influence, help the child debunk tobacco company messages, and work on skills to resist peer influences).

Smoking and dysphoria often coincide,<sup>101,102</sup> and

smokers tend to have a more pessimistic outlook regarding the world and their future than do nonsmokers.<sup>103</sup> Smoking among high school students is associated with a high prevalence of suicide attempts.<sup>7</sup> Kendler and colleagues<sup>102</sup> suggested that the association between smoking and negative mood is not causal. Rather, a common genetic susceptibility may predispose some individuals to both depression and smoking.

#### **Adolescent Prevention Programs**

It is intuitive that preventing youths from initiating smoking should be a principal component of tobacco control policy. Although a number of smoking prevention programs have been developed and tested, we are not aware of any empirically based prevention program that has been developed specifically for pediatricians. Developing and testing tobacco use prevention programs for pediatricians should be a focus of future research. Therefore, in this section we will review the available literature on smoking prevention programs and then outline preventive activities that would be appropriate for pediatricians and their staff.

Effective smoking prevention programs can be divided into 2 types—educational interventions based in schools or the community and public policy interventions. In this section, we review each type and suggest ways in which they can be integrated into pediatric practice.

#### *Educational Interventions*

Several meta-analyses<sup>100,104,105</sup> examined the effectiveness of educational smoking prevention programs. Bruvold<sup>100</sup> evaluated the effectiveness of 94 separate adolescent smoking prevention programs conducted in the 1970s and 1980s. Bruvold<sup>100</sup> categorized the educational programs into 4 types: rational, developmental, social norms, and social reinforcement. Rational programs provide factual information about smoking, such as adverse health effects. Developmental interventions attempt to increase self-esteem and self-reliance and foster decision-making and interpersonal skills. Prevention programs based on a social norm orientation aim to reduce alienation and/or boredom and increase self-esteem. While developmental interventions typically use lectures and group discussions to convey information, programs based on a social norm approach usually involve participation in community projects, vocational training, and recreational activities. Both the developmental and social norm prevention programs have little or no focus on smoking, per se. Finally, the social reinforcement orientation to smoking prevention attempts to help young people develop skills to recognize and resist social pressure to use drugs and to identify immediate social and physical consequences of smoking.

A meta-analysis by Bruvold<sup>100</sup> suggested that rational (ie, information-based) prevention programs have little or no effect on smoking onset, developmental and social norm programs yield modest preventive effects, and interventions based on social reinforcement produce the best outcomes. His find-

ings are consistent with the 1994 Surgeon General's Report on adolescent smoking. Prevention programs that inoculate children against social influences to smoke (eg, peer pressure and advertising) are the only ones shown to significantly reduce or delay smoking.<sup>7</sup> The impact of preventive interventions, however, lessen over time, and interventions that use several methods of dissemination (eg, school, community, and media) often produce the best results.<sup>7</sup>

#### Public Policy Interventions

Public policy interventions designed to prevent or reduce adolescent smoking are critically important for at least 3 reasons. First, it is difficult to reach all children with comprehensive tobacco prevention programs. In contrast, a hallmark of public policy interventions is their wide reach. Second, public policy interventions help bolster the impression that tobacco use is a nonnormative behavior. Third, public policy interventions tend to reduce the relative psychosocial benefits of tobacco use.<sup>7</sup> Among the most important public policy interventions are those that restrict youth tobacco use, restrict youth access to tobacco, and taxation.<sup>106</sup>

Smoking restrictions and bans reinforce the medical community's message that smoking is a public health threat and an unacceptable behavior. Most restrictions on smoking have been initiated by state and local governments and involve banning smoking in public places, workplaces, schools, and restaurants.<sup>7,107-109</sup> Although targeted restrictions and bans are popular with the public and have proven to be effective deterrents to tobacco use, a total ban on tobacco use is not likely to be widely adopted, at least in the United States. As Bierer and Rigotti<sup>107</sup> note, tobacco was widely used and integrated into the American economy before discoveries about its harmful health impact. Also, deeply ingrained political interests, reinforced by the lobbying power of the tobacco industry, support the sale of tobacco. Finally, national experience with a total ban on alcohol use and a strongly held value of individual liberty and choice imply that a total ban on tobacco use would not likely be acceptable to the public.

An example of the effective application of a targeted ban on tobacco use is provided by basic military training (BMT) of the United States Air Force. On entering the enlisted ranks of the United States Air Force, recruits are required to submit to a 6-week ban on the possession of all tobacco products. The tobacco ban is strictly enforced, and violations typically result in the recruit being required to repeat BMT. Klesges and colleagues<sup>110</sup> monitored the tobacco use of a large cohort ( $n = 29\ 044$ ) of recruits for 1 year after the BMT smoking ban. They found wide support for the smoking ban from both smoking and nonsmoking recruits. Of the recruits who were regular smokers before entering the military (ie, 28.9%), 17.7% quit in the year after BMT. Given that the 1-year spontaneous remission rate is ~5% among smokers in general, these findings suggest that the ban increased quitting among young smokers by several fold.

#### Pediatric Interventions for the Prevention of Tobacco Use

Pediatricians can play an important role in preventing tobacco use among children by adopting and modeling effective prevention strategies.<sup>14,16,111</sup> A comprehensive strategy for tobacco use prevention begins with the environment created in the pediatrician's office and penetrates into the community through active involvement in community prevention efforts by the pediatric staff. Table 4 lists prevention strategies that can be adopted by pediatricians and their staff.

#### Office and Setting Factors

The most basic tobacco prevention intervention that a pediatrician can deliver to children is to model a tobacco-free lifestyle.<sup>112</sup> Pediatricians should refrain from tobacco use and establish office policies that preclude office staff (eg, nurses, clerical staff) from modeling tobacco use. A smoke-free office environment that contains antismoking posters, pamphlets, and educational material sends a strong message that tobacco use is not the norm and is inconsistent with a healthy lifestyle.<sup>14</sup> Parents should be encouraged to share these materials with smokers in their home, and to ask the pediatrician for assistance in creating a smoke-free household.

#### Countering Social Influences

Pediatricians also have a role in helping young people resist pressures to smoke.<sup>16</sup> Pediatricians should provide praise and reinforcement for patients of all ages who do not smoke. Children and adolescents value such messages from their pediatrician,<sup>111</sup> and the pediatrician is in a unique position to discuss the health benefits of a smoke-free lifestyle. Equally important, pediatricians can help patients develop tobacco refusal skills. Perry and Silvis<sup>16</sup> suggest that pediatricians should engage the young patient in role-playing scenarios in which they practice resisting various forms of pressure to smoke. The pedia-

**TABLE 4.** Pediatric Interventions for the Prevention of Tobacco Use

Office and setting factors
Model a tobacco-free lifestyle
Provide a tobacco-free office environment
Place anti-tobacco messages (eg, posters, pamphlets) in office
Seek continuing medical education on tobacco-use prevention
Encourage parents to create a tobacco-free home environment
Countering social influences
Reinforce abstinence from all tobacco products
Teach about the immediate negative consequences of tobacco use
Provide counteradvertising education
Teach tobacco refusal techniques
Community-based interventions
Participate in organizations attempting to reduce tobacco use
Disseminate tobacco-use prevention messages in local media
Participate in school-based prevention programs
Policy interventions
Provide expert testimony to legislative bodies
Lobby legislators to support tobacco-use prevention efforts
Support initiatives to increase excise taxes on tobacco products
Encourage enforcement of laws designed to prevent tobacco sales to minors

trician could play the role of the patient's best friend and offer the patient a cigarette. The patient, then, may practice saying no. The pediatrician could coach the adolescent on ways to refuse tobacco products in a manner acceptable to the patient. Another scenario might involve the youth being offered a cigarette by a group of his/her friends, all of whom are smoking. Learning to cope with such powerful pressure to smoke is an important step toward staying smoke-free.

Pediatricians also may use brief interventions to counteract advertising used by the tobacco industry to recruit new smokers. The pediatrician could show a cigarette advertisement to the patient and ask open-ended questions, such as "What message is the cigarette company trying to send you with this advertisement?" and "What do you think about it?" If the advertisement associates cigarette smoking with beauty and glamour, the pediatrician might ask "In what ways do premature wrinkles, breath like an ashtray, and nicotine stains on your teeth enhance your attractiveness?" By encouraging youth to become critical thinkers, the pediatrician may help his/her patients debunk the tobacco advertisement and reduce their likelihood of using tobacco products.

#### *Community-Based Interventions*

Pediatricians should actively support community-based tobacco control programs in the school system and in the community at large.<sup>14</sup> They may serve as speakers and expert consultants. School-based smoking prevention programs should involve at least 5 sessions each year in the sixth through eighth grades and should emphasize social factors that influence smoking onset, short-term health consequences, and refusal skills. School-based programs should be incorporated into the existing school curricula, and students should be actively involved in the delivery of the program.<sup>7</sup> As an expert consultant, the pediatrician is in a unique position to encourage schools to use state-of-the-art concepts and materials.

#### *Policy Interventions*

Sockrider<sup>111</sup> noted that pediatricians may play a leadership role in community efforts to introduce policies on excise taxes, youth access, and tobacco advertising. Pediatricians, like other physicians in the community, have considerable respect and credibility. They are uniquely suited to provide advice and testimony that can be used to encourage legislative bodies to support policies aimed at reducing rates of smoking onset in the community. Medical societies, such as the American Medical Association and the American Academy of Pediatrics, have been very involved in initiatives designed to reduce youth access and tobacco use,<sup>7</sup> and they may provide an excellent forum for concerned pediatricians.

### **SMOKING CESSATION WITH ADOLESCENTS**

It has been estimated that ~3000 young people begin smoking every day,<sup>9</sup> and rates of smoking among high school seniors have increased markedly over the past decade.<sup>8</sup> Like adults, young people become addicted to nicotine, would like to quit

smoking, make many attempts to quit, but rarely succeed.<sup>11</sup> A comprehensive pediatric office-based tobacco control program must include smoking cessation for adolescents who smoke. Brief physician office-based interventions with adults reveal reliable, albeit modest, cessation rates.<sup>113</sup> More intensive intervention and use of nicotine replacement therapy and other medications may double the quit rates.<sup>70</sup> Although the empirical basis for intervening on smoking with young people is not as strong as it is with adults,<sup>17</sup> it is likely that similar strategies, with some modification, will yield comparable quit rates in adolescents. Indeed, one nonrandomized, controlled trial<sup>114</sup> and an uncontrolled study<sup>115</sup> suggest that targeted training programs can increase the tobacco knowledge and clinical skills of pediatricians. Unfortunately, neither of these studies examined whether intervention efforts by the trained pediatricians were effective in terms of reduced tobacco exposure among children and adolescents. Thus, additional research regarding pediatrician cessation interventions is needed.

Effective cessation programs for adolescents should focus on immediate consequences of tobacco use, have specific attainable goals, and use contracts that include rewards.<sup>116</sup> The program should provide social support and focus on avoidance, stress management, and refusal skills.<sup>116</sup> It is estimated that ~70% of adolescents see their pediatrician on an annual basis,<sup>117</sup> and adolescents look to pediatricians for advice and guidance and perceive them as experts in health promotion. If pediatricians are able to help only a modest proportion of the young people to quit smoking, the public health impact still will be quite substantial.<sup>117</sup>

The 4-A model described above (Ask, Advise, Assist, and Arrange) for use with parents who smoke also applies to interventions with youths.<sup>113</sup> However, the pediatrician should also include a fifth A—Anticipatory Guidance—when working with adolescents. This step involves an assessment of the previously mentioned risk factors for smoking initiation, as well as the anticipation of smoking experimentation and guidance toward abstinence. Should the pediatrician find that the patient is at risk for initiating smoking or has already experimented with cigarettes, the subsequent 4 As should be examined and a dialogue initiated to reverse any misconceptions and highlight the importance of remaining tobacco-free or quitting smoking.<sup>118</sup>

In addition to the 5-A model, another model, presented in the Guidelines for Adolescent Preventive Services of the American Medical Association<sup>119</sup> has 4 steps: Gather Information, Assess Further, Problem Identification, and Solutions. The 5-A model and the Guidelines for Adolescent Preventive Services model share the underlying concept of taking advantage of physician office visits to intervene on tobacco, proceeding systematically, and working in concert with the patient.<sup>117</sup>

It is also important to take note of some important differences between adult and adolescent smokers. Adolescents typically are more motivated to quit,<sup>120</sup> and they make more of an effort to quit smoking

than adults.<sup>121</sup> However, adolescents seem to experience more withdrawal symptoms than adults, and they are more likely to relapse.<sup>120</sup> DiGuisto<sup>122</sup> suggests that relapse prevention should be part of an adolescent smoking cessation program. While the vast majority of adolescent smokers are cognizant of the difficulties involved in quitting smoking, there is no evidence of particularly refractory subgroups.<sup>120</sup>

Epps and Manly<sup>13</sup> reported that ~60% of smokers initiate smoking before 16 years of age. Moreover, the risk of smoking initiation steadily increases from 12 to 16 years of age after which time a decline is noted.<sup>123</sup> Breslau and Peterson<sup>124</sup> demonstrated that smokers who delayed the initiation of smoking were more likely to quit than were those who started smoking at an earlier age. Pediatricians should provide more intensive interventions to those patients who began smoking at an early age.

Rutger and colleagues<sup>121</sup> found that adolescent peer groups are strikingly homogenous. Thus, a predominantly smoking peer group not only influences initiation, it also maintains smoking status and hampers quit attempts by members. Among adolescents who attempt to quit smoking, 20% report that cigarette offers from friends, harassment, and proximity of individuals who smoke made it difficult for them to quit.<sup>121</sup> Similarly, Burt and Peterson<sup>120</sup> found successful quit attempts were primarily dependent on the prevalence of smoking among peers.

Although there is a proliferation of research on adolescent smoking prevention programs, investigations into adolescent cessation programs are sparse and marred by methodological weaknesses. For example, Burton<sup>17</sup> reported that often results are not reported based on the number of beginning smokers in a study. Thus, attrition is not accounted for and results are often skewed. Additionally, comparison groups and biochemical assessment of smoking status are rarely used.<sup>17</sup> Further, many of the studies have small sample sizes.<sup>122</sup>

In one study, Weissman et al<sup>125</sup> used monetary rewards to motivate a group of hard-core adolescents to quit smoking. Four of 6 males achieved long-term cessation, while all 5 females (including 2 pregnant females) dropped out of the study. The authors speculated that tangible rewards have less of an impact on the smoking status of females than do social consequences.

Pediatricians should be alert to the vital role that peer pressure plays on smoking initiation, maintenance, and cessation. When counseling young people, they should bring up the issue of peer influence and should work with youths to come up with a plan of action that takes these influences into account. This may take the form of problem-solving and role-playing ways of coping with peer pressure. It may also be possible to encourage the young person to invite his/her friends to quit smoking together. Time permitting, the youth should be encouraged to bring a friend or 2 with him/her to the next visit. By mobilizing social support, the pediatrician can increase the chances of a successful intervention.

MI<sup>123</sup> can be very effective for the concerned, albeit busy, physician. A key feature of MI emphasizes the

importance of capitalizing on clinical opportunities to deliver a personalized health message, focusing on the benefits of quitting as well as the hazards of continuing to smoke. MI combines strategies from motivational psychology, client-centered therapy, and processes of change in the recovery from addiction<sup>127</sup> to incorporate open-ended questions designed to encourage patient participation in discussion and treatment planning, assessment of readiness to change, and the use of stage-dependant brief interventions.<sup>42</sup> Through eliciting the patient's own reasons for change, MI seeks to foster intrinsic motivation for altering substance use patterns, while simultaneously promoting a partnership model of intervention in which the patient and physician work together to develop and implement an effective treatment plan. MI has demonstrated positive effects in the treatment of a variety of substance abusers (including tobacco) in both adults and adolescents.<sup>126</sup> For instance, Colby and colleagues<sup>128</sup> demonstrated the efficacy of a brief MI intervention for adolescent smokers through high rates of recruitment, retention, quit attempts, and significant periods of continuous abstinence.

As with adults, it is important to assess the youth's stage of readiness to quit cigarette smoking or other forms of tobacco use and use interventions appropriate for that stage. Pallonen<sup>129</sup> found that adolescents and adults seem strikingly similar with regard to behaviors exhibited during the various stages of the cessation process. Many adolescents have quit smoking several times in the past,<sup>130</sup> and candid discussion may reveal clues to success, as well as particular issues and obstacles that must be overcome. Although MI for adolescent smoking cessation remains to be empirically investigated, Lawendowski<sup>126</sup> provides a comprehensive review of MI with this population.

Nicotine replacement therapy and, perhaps, bupropion hydrochloride, in conjunction with behavioral intervention, should also be considered for adolescents who are addicted to nicotine. Although data on the use of these medications with adolescents are currently lacking, a pilot study of the effects of the nicotine patch on adolescent smoking cessation<sup>131</sup> reported that the patch was safe and well-tolerated. In this study, a majority of the subjects reduced their rate of smoking, although the long-term quit rate was quite low.<sup>131</sup> An additional recent study<sup>132</sup> found similar results with 101 adolescents who smoked a minimum of 10 cigarettes per day. This nonrandomized study used a 15 mg/16 hours patch for 6-weeks and found that although smoking rates decreased significantly during the course of the study, the results declined at 12-week and 6-month follow-ups. The authors concluded that the use of a nicotine patch with minimal behavioral intervention does not constitute an effective treatment with adolescent smokers. The National Institutes of Health is currently funding several studies of nicotine replacement therapy in youths, and additional findings should provide sound guidelines for clinical settings.

Another pilot study<sup>133</sup> compared treatments of television intervention, school intervention, com-

bined television and school, and no treatment control group. Flay and colleagues<sup>133</sup> found that at 2-year follow-up, there was no significant change in smoking behavior, intentions to quit, or refusal self-efficacy but that there were significant maintenance of knowledge differences.

Despite the limited research, there is a consensus that adolescents who are ready to try to quit smoking are likely to benefit from many of the same behavioral interventions found useful in adults. They should be encouraged to prepare for a quit date, with particular attention devoted to the prevention of weight gain. The latter is particularly important for adolescent girls.<sup>85–88</sup> Nicotine replacement therapy<sup>131</sup> and bupropion hydrochloride may help, as would advice on exercise and low-calorie snacks. Follow-up support is extremely important for young people, and the concerned pediatrician should also consider other ways of rewarding adolescent smoking modification. An office lottery for youths who quit smoking might feature opportunities to win athletic equipment, tickets to the theater, or CDs. Merchants from the community may be willing to donate merchandise in exchange for very positive publicity.

Finally, issues pertaining to confidentiality of the clinic visit warrant discussion with adolescent patients and their parents. In focus groups conducted with adolescent smokers, many teens assumed that their physician would tell their parents about their smoking status.<sup>134</sup> Regardless of whether the parents already knew, most adolescents viewed this as a barrier for discussing smoking with their health care

provider. Moreover, most adolescents also reported concerns about receiving a lecture from their physician if they did disclose their status as a smoker. Despite these findings, however, many teens stated that if their doctor were to ask them confidentially about smoking, they would accept a trusting relationship with their physician and respond open and honestly. If pediatricians are to engage adolescents (not lecture to them) on the topic of cigarette smoking, it is obvious that measures must be taken to ensure the confidentiality of the clinic visit. Providers could have parents sign a general confidentiality agreement explaining that their ability to serve the child is dependent on the child feeling comfortable engaging in discussions of a sensitive nature.<sup>134</sup> Naturally, providers would not violate this agreement with regard to adolescent smoking. Moreover, for adolescents, information pertaining to their tobacco use could be gleaned from less invasive questionnaires or during the physical examination period where questioning may feel more spontaneous.<sup>118</sup>

### MODEL FOR COMPREHENSIVE PEDIATRICIAN-BASED TOBACCO REDUCTION PROGRAM

Figure 1 presents a schematic diagram of a proposed model for a comprehensive pediatrician-based tobacco reduction program. This model integrates the recommendations made throughout this review and may serve as a guide for both clinical practice and research initiatives. The model begins with the pediatrician and his/her staff—unless the office setting and behavior of health care personnel are con-

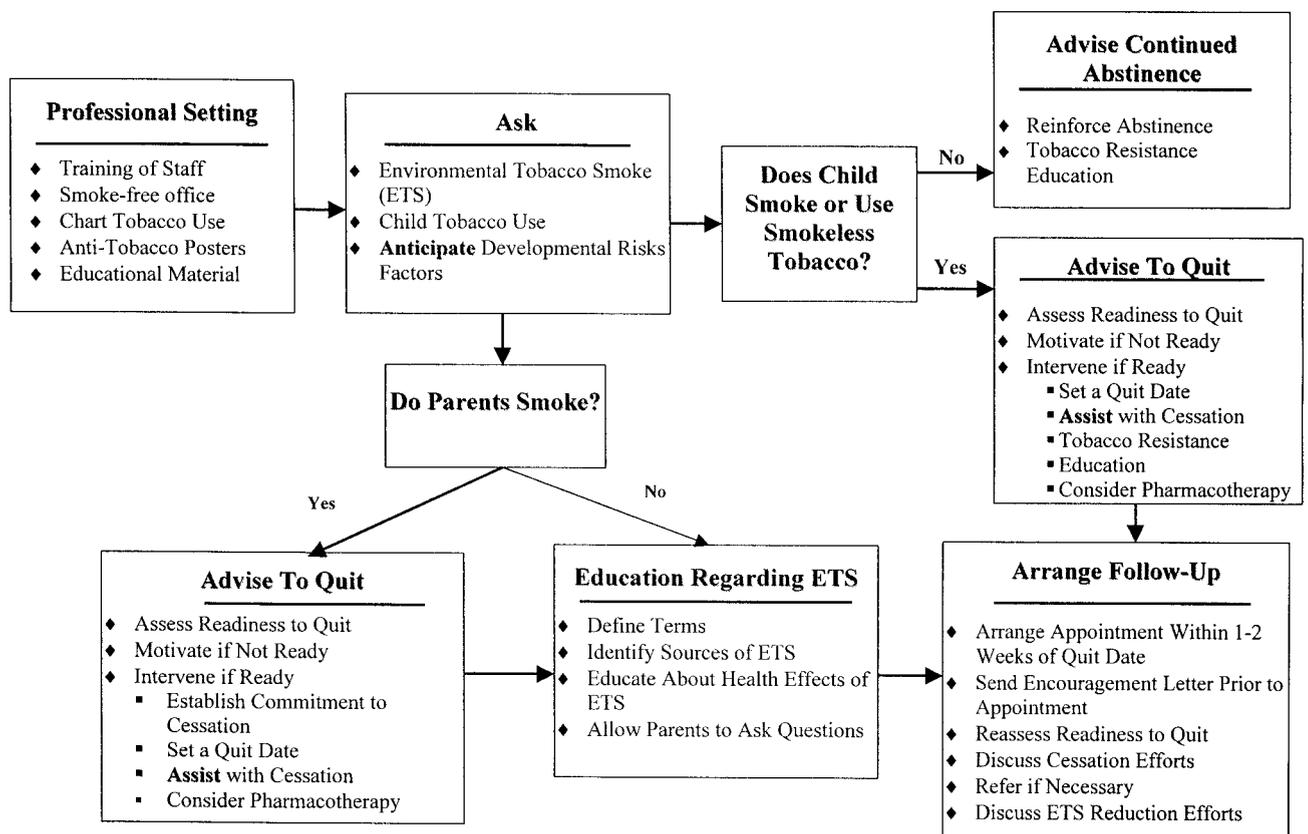


Fig 1. Model for comprehensive pediatrician-based tobacco exposure reduction program.

sistent with the message that tobacco exposure is nonnormative and detrimental to youths, efforts at reducing youth tobacco exposure will be diminished. The next box, labeled "Ask," recommends that the pediatrician assess factors related to tobacco exposure during all patient and parent contacts. The assessment should include ETS exposure for infants and children and tobacco use among parents and adolescents. Pediatricians should anticipate risk factors for tobacco use at each developmental stage.

If assessment reveals that the patient/parent is tobacco free, the pediatrician should let them know how pleased he/she is and encourage continued abstinence. If appropriate, the pediatrician also may take a moment or two to educate parents about ETS and to raise the issue of peer pressure and resistance skills with adolescents. If either the parent or adolescent uses tobacco products, the pediatrician should use the 4-A model of tobacco intervention, including advising the individual to quit, assisting with cessation, and arranging follow-up. Where appropriate, the pediatrician should also address the issue of pharmacotherapy for parents and adolescents who are ready to try to quit smoking. Finally, the model suggests that each smoker should be followed to reinforce and encourage cessation efforts and/or to address obstacles to success.

### CONCLUSION

Key statements from the American Academy of Pediatrics Committees on Adolescence,<sup>112</sup> Substance Abuse,<sup>135</sup> and Environmental Hazards<sup>136</sup> call on pediatricians to play an active role in the antitobacco arena. With respect to ETS, pediatricians should seek a history of ETS for all children who pass through their clinics. Moreover, whenever they encounter a child with lower respiratory tract infection, persistent respiratory symptoms, and unexplained alteration of lung function, they should consider the visit a teachable moment and target the family for intensive intervention. Pediatricians should increase their efforts to inform patients and parents about the hazards of tobacco, and they should set an example by not using tobacco products (see also the guidelines of the American Heart Association Committee on Atherosclerosis and Hypertension in Children<sup>137</sup>).

With respect to active smoking and use of tobacco products, pediatricians should be knowledgeable about the extent and nature of tobacco abuse in their community as well as the health consequences of such use, assume a leadership role in both primary and secondary prevention of smoking, use the office environment to communicate attitudes about smoking, act as an advocate for tobacco education and intervention in the schools, support efforts to prevent advertising of all tobacco products, routinely take a history of smoking and other tobacco use from children and adolescents, assist with the development of skills to help children and adolescents resist smoking pressure and/or stop smoking, and encourage and counsel smoking parents to relinquish their habit.

Our review endorses these recommendations and reinforces the view that pediatricians are in a unique position to intervene on tobacco in patients and par-

ents. Young people look to pediatricians for advice and guidance, and parents welcome and expect their intervention. Despite this, few pediatricians address tobacco, and pediatric residency training programs are doing little to prepare the next generation of pediatricians to enter the fray. Indeed, pediatric residents are less active in the areas of tobacco prevention and control than are residents in other disciplines. When given the appropriate preparation, pediatric residents may become an effective force for change.<sup>34</sup> Future research should be directed at approaches toward training pediatric residents in tobacco prevention and control and measuring their impact on the health and behavior of patients, parents, and families.

Although there is much that pediatricians can do to encourage patients to pursue a smoke-free lifestyle, the empirical foundations for intervening in office settings are woefully weak. While the literature for physician intervention in adults is more firmly established, few studies with children are available, and answers to basic questions on procedure and protocol are lacking. There is a need for more research on pediatric office-based interventions for control of ETS, prevention of tobacco-use onset, tobacco-use cessation in young people, and the efficacy of nicotine replacement therapy and bupropion hydrochloride for smoking cessation in adolescents. What role, if any, do nicotine replacement products have in interventions aimed at discouraging ETS in the home and other settings, how might pediatricians intervene more effectively to help postpartum former smokers remain abstinent, and how can the pediatrician become a stronger advocate for smoke-free community norms?

These and other important issues must be addressed, although it is not necessary to wait for all of the answers before taking an active stance. Studies of smoking cessation in adults and prevention of smoking onset in the schools provide suggestions for how to proceed, as do the recent clinical guidelines for physicians.<sup>113</sup> We provide a model for office-based interventions that could be followed by concerned pediatricians. By proceeding systematically, using careful assessment procedures and state-of-the-art interviewing and intervention techniques, and providing necessary follow-up and support, it is possible to intervene quite effectively on tobacco. As more studies on effective approaches to tobacco intervention in children and adolescents are available, it will be possible to follow proven protocols and to modify the overall model accordingly.

### APPENDIX

#### Sampling of Educational Materials and Handouts

For physicians

*Smoking Cessation Clinical Practice Guideline* (AHCPR)

*Clinical Opportunities for Smoking Intervention: A Guide for the Busy Physician* (USDHHS)

*Helping Smokers Quit: A Guide for Primary Care Physicians* (USDHHS)

*How to Help Your Patients Stop Smoking: A National Cancer Institute Manual for Physicians* (NIH)

*Clinical Interventions to Prevent Tobacco Use by Children and Adolescents* (NIH)

For children and adolescents/smoking prevention

- The Risks of Tobacco Use: A Message to Parents and Teens* (AAP)
- Starting Free, Good Air for Me Story Book* (ACS)
- Early Start Kit* (ACS)
- Tobacco-Free Young America* (ACS)
- Fifty Most Asked Questions About Smoking and Health and the Answers* (ACS)
- Children and Tobacco Guide* (ACS)
- Spider-Man, Storm, and Power Man Battle Smokescreen* (ACS)
- Avoid the Tobacco Trap: Tobacco Risk Avoidance Program* (ACS)
- Children, Teens, and Smoking: A Message to Parents* (AHA)
- No Smoking Coloring Book* (ALA)
- As You Live You Breathe* (ALA)
- Have Fun Smoking Puzzle* (ALA)
- No Smoking Kids Magazine* (ALA)
- No Smoking Lungs at Work* (ALA)
- Tobacco Free Teens* (ALA)
- Five Ways Tobacco Companies Try to Trick You* (ALA)
- No Smoking Can Cause a Healthy Long and Fulfilled Life: Prepared by Kids* (ALA)
- Tips for Teens About Smoking* (ALA)
- Parents—Help Keep Your Kids Tobacco Free* (USDHHS/CDC)
- What You(th) Should Know About Tobacco* (USDHHS/CDC)
- JAM: The Performance Magazine* (USDHHS/CDC)
- Stop the Sale: Prevent the Addiction* (USDHHS/CDC)

ETS

- Environmental Tobacco Smoke: A Danger to Children* (AAP)
- The Smoke Around You: The Risks of Involuntary Smoking* (ACS)
- Don't You Dare Breathe That Air* (ALA)
- Protecting Yourself and Your Family From Secondhand Smoke* (ALA)
- Facts About . . . Secondhand Smoke* (ALA)
- Reducing the Health Risks of Secondhand Smoke: What You Can Do at Home, Work, and in Public Places* (ALA)
- Secondhand Smoke* (NHVI)
- It's Time to Stop Being a Passive Victim* (USDHHS/CDC)
- Secondhand Smoke* (USEPA)
- Respiratory Effects of Passive Smoking* (USEPA)
- Setting the Record Straight: 2nd Hand Smoke Is a Preventable Health Risk* (USEPA)
- Protecting Yourself and Your Family From Secondhand Smoke* (USEPA)
- Children and Secondhand Smoke* (USEPA)

Smoking cessation

- Breaking Free* (ACS)
- Why Start Life Under a Cloud* (ACS)
- Set Yourself Free* (ACS)
- How to Stay Quit Over the Holidays* (ACS)
- When Smokers Quit* (ACS)
- Want 3 Good Reasons to Quit Smoking* (ACS)
- Smart Move! A Stop Smoking Guide* (ACS)
- How to Quit Cigarettes* (ACS)
- The Decision is Yours* (ACS)
- How to Avoid Weight Gain When Quitting Smoking* (AHA)
- Cigarette Smoking* (ALA)
- Don't Let Your Dreams Go up in Smoke* (ALA)
- Freedom From Smoking You/Your Family* (ALA)
- Facts About . . . Nicotine Addiction and Cigarettes* (ALA)
- Facts About . . . Smoking and Pregnancy* (ALA)
- Why Do You Smoke* (NCI)
- Smoking Facts and Tips for Quitting* (NCI)
- 60 Minutes to a Smoke Free Life* (NHVI)
- Smoking and Pregnancy* (NHVI)
- Commit to Quit: Advice From Real People* (SKB)
- Is Your Baby Smoking* (USDHHS/CDC)
- Pregnant? That's 2 Good Reasons to Quit Smoking* (USDHHS/CDC)
- You Can Quit Smoking* (USDHHS/CDC)

Smokeless tobacco use

- Smokeless Tobacco: Guidelines for Kids* (AAP)
- Don't Bite Off More Than You Should Chew* (ACS)
- Quitting Spitting: More Than Enough Reasons to Stop Using Spit Tobacco Now!* (ACS)
- Spitting Into the Wind: The Facts About Dip and Chew* (USDHHS/CDC)

American Cancer Society, 1-800-ACS-2345; AHA—American Heart Association, 1-800-AHA-USA1; ALA—American Lung Association, 1-800-LUNG-USA; NCI—National Cancer Institute, 1-800-4-CANCER; NHVI—National Health Video, Inc, 1-800-543-6803; NIH—National Institutes of Health/National Heart, Lung, and Blood Institute, 1-301-951-3260; SKB—SmithKline Beecham, 1-800-366-8900; USDHHS/CDC—US Department of Health and Human Services/Centers for Disease Control and Prevention, 1-800-CDC-1311; USEPA—US Environmental Protection Agency, 1-800-438-4318.

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