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Annals of Internal Medicine | Clinical Guideline

Primary Care Interventions to Prevent Tobacco Use in Children and Adolescents: U.S. Preventive Services Task Force Recommendation Statement*

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Description: Update of the 2003 U.S. Preventive Services Task Force (USPSTF) recommendation on primary care interventions to prevent tobacco use in children and adolescents.

Methods: The USPSTF reviewed the evidence on the effectiveness of primary care interventions on the rates of initiation or cessation of tobacco use in children and adolescents and on health outcomes, such as respiratory health, dental and oral health, and adult smoking. The USPSTF also reviewed the evidence on the potential harms of these interventions.

Population: This recommendation applies to school-aged children and adolescents. The USPSTF has issued a separate recommendation statement on tobacco use counseling in adults and pregnant women.

Recommendation: The USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use in school-aged children and adolescents.

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For author affiliation, see end of text.

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† For a list of USPSTF members, see the Appendix (available at www.annals.org).

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The U.S. Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific preventive care services for patients without related signs or symptoms.

It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.

Summary of Recommendation and Evidence

The USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use in school-aged children and adolescents. (B recommendation)

See the Clinical Considerations section for more information on effective interventions.

See the **Figure** for a summary of the recommendation and suggestions for clinical practice.

Appendix Table 1 describes the USPSTF grades, and **Appendix Table 2** describes the USPSTF classification of levels of certainty about net benefit (both tables are available at www.annals.org).

Rationale

Importance

Tobacco use is the leading cause of preventable death in the United States. Each year, approximately 443 000 deaths are attributable to smoking, including nearly 161 000 deaths from cancer, 128 000 from cardiovascular diseases, and 103 000 from respiratory diseases. Smoking costs the United States approximately $96 billion each year in direct medical costs and $97 billion in productivity losses due to premature death (1).

Recognition of Behavior

A person's path to daily smoking and nicotine dependence can be described in 5 stages: susceptible to smoking (never smoked); initiation (trying the first cigarette); experimentation (repeatedly trying cigarettes, may show signs of addiction); established smoking (regular smoking, likely to show signs of addiction); and nicotine dependence.

Children are susceptible to smoking experimentation and initiation. It can take up to 2 years to progress from early experimentation to addiction, although some children and adolescents progress more rapidly to nicotine dependence (2).

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Figure. **Primary care interventions to prevent tobacco use in children and adolescents: clinical summary of U.S. Preventive Services Task Force recommendation.**

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U.S. Preventive Services TASK FORCE
www.USPreventiveServicesTaskForce.org

PRIMARY CARE INTERVENTIONS TO PREVENT TOBACCO USE IN CHILDREN AND ADOLESCENTS CLINICAL SUMMARY OF U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATION

Population	School-aged children and adolescents
Recommendation	Provide interventions to prevent initiation of tobacco use. Grade: B

Risk Assessment	The strongest factors associated with smoking initiation in children and adolescents are parental smoking and parental nicotine dependence. Other factors include low levels of parental monitoring, easy access to cigarettes, perception that peers smoke, and exposure to tobacco promotions.
Behavioral Counseling Interventions	Behavioral counseling interventions, such as face-to-face or phone interaction with a health care provider, print materials, and computer applications, can reduce the risk for smoking initiation in school-aged children and adolescents. The type and intensity of effective behavioral interventions substantially varies.
Balance of Benefits and Harms	There is a moderate net benefit to providing primary care interventions to prevent tobacco use in school-aged children and adolescents.
Other Relevant USPSTF Recommendations	The USPSTF has made recommendations on counseling and interventions to prevent tobacco use and tobacco-caused disease in adults and pregnant women. These recommendations are available at www.uspreventiveservicestaskforce.org.

For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, please go to www.uspreventiveservicestaskforce.org.

Effectiveness of Interventions to Change Behavior

The USPSTF found adequate evidence that behavioral counseling interventions, such as face-to-face or phone interaction with a health care provider, print materials, and computer applications, can reduce the risk for smoking initiation in school-aged children and adolescents.

Harms of Interventions to Change Behavior

The USPSTF found no evidence on the harms of behavioral interventions to prevent tobacco use; however, it believes that the magnitude of these potential harms is probably small to none.

USPSTF Assessment

The USPSTF concludes with moderate certainty that primary care–relevant behavioral interventions to prevent tobacco use in school-aged children and adolescents have a moderate net benefit.

CLINICAL CONSIDERATIONS

Patient Population Under Consideration

This recommendation applies to school-aged children and adolescents. The USPSTF has issued a separate recommendation statement on tobacco use counseling in adults and pregnant women.

Assessment of Risk

In 2009, 8.2% of middle school students and 23.9% of high school students reported current use of any tobacco product (3). Although younger children may be susceptible to smoking, research indicates that adolescents may be especially vulnerable to nicotine addiction.

The prevalence of smoking in the United States is higher in male high school students (19.8%) than female students (19.1%) (4). Two of the strongest factors associated with smoking initiation in children and adolescents are parental smoking and parental nicotine dependence. Other factors include low levels of parental monitoring, easy access to cigarettes, the perception that peers smoke, and exposure to tobacco promotions.

Interventions to Prevent Tobacco Use

The type and intensity of effective behavioral interventions substantially varied in the evidence review, ranging from no in-person interaction with a health care professional to 7 group sessions totaling more than 15 hours (1). In 1 intervention, families received a packet of materials for parents and children and a 28-minute video with a viewing guide. These families received 1 counseling call 3 to 6 weeks after receiving the written materials and another call 14 months after enrollment. Another intervention consisted of creating a tobacco-free office and giving patients a series of antitobacco messages on preprinted "prescription" forms. The most intensive intervention focused on universal substance abuse and problem behavior prevention for families. In this intervention, the youth and at least 1 parent participated in 7 group and family sessions over 7

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weeks (each session lasted 2 to 2.5 hours) and received workbooks with activities to complete at home.

Even very minimal interventions, such as mailing materials to a youth's home, had substantial effects on reducing smoking initiation. One intervention mailed tailored newsletters addressed to the student every 3 weeks; another intervention sent age-related materials 4 times over 12 months. In a third intervention, participants were mailed 5 core activity guides with newsletters and tip sheets approximately every 2 weeks, with 1 booster guide at 1 year (1).

Many interventions had similar content, such as the participant's attitudes, beliefs, and knowledge about smoking; the consequences of smoking; the influence of the social environment, including tobacco marketing; and skills to decline cigarettes. Several interventions targeted parental attitudes and beliefs about smoking and parent–child communication.

Interventions for Tobacco Cessation

Evidence on the effectiveness of cessation interventions delivered in primary care settings to school-aged children and adolescents who have experimented with smoking or are regular smokers is limited. The USPSTF examined the evidence on behavioral interventions to promote smoking cessation in children and adolescents who were classified as smokers (1). Few studies targeted regular, established smokers or stratified findings by length or amount of smoking (such as experimenters vs. established smokers). A pooled meta-analysis of 7 trials, which included 2328 children and adolescents and examined interventions to promote smoking cessation, found a small but statistically insignificant effect at 6- to 12-month follow-up favoring the intervention (risk ratio, 0.96 [95 CI%, 0.90 to 1.02]) (1).

Although evidence on the effectiveness of primary care–relevant interventions in reducing smoking in children and adolescents is limited, some evidence from other literature shows that school- and community-based behavioral counseling programs can promote smoking cessation in adolescent smokers. In a meta-analysis of 64 trials, 40 of which were school-based, Sussman and Sun (5) found a 4–percentage point difference in smoking cessation rates between the intervention and control groups (11.8% vs. 7.5%, respectively). A longitudinal evaluation of 41 community-based programs reported biochemically validated cessation rates similar to those in randomized trials (averaging 14% at the end of the program and 12% at 12-month follow-up) (6).

No medications are currently approved by the U.S. Food and Drug Administration for tobacco cessation in children and adolescents. Two studies that evaluated behavioral interventions plus medication (sustained-release bupropion alone or combined with nicotine replacement therapy) showed no statistically significant benefit from the medication (1). Evidence on complementary and alternative medicine, such as acupuncture, for smoking cessation in children and adolescents is not available (1), and such interventions have demonstrated no long-term benefits in adults (7).

Other Approaches to Prevention and Cessation

The Community Preventive Services Task Force has made the following 4 recommendations for school-aged children and adolescents (8).

1. Mobile phone–based interventions for tobacco cessation, on the basis of sufficient evidence of their effectiveness in increasing abstinence from tobacco among persons interested in quitting, as well as community-wide, proactive telephone support (proactive follow-up) combined with patient education materials, on the basis of strong evidence of their effectiveness in increasing tobacco cessation in both clinical and community settings. However, the Community Preventive Services Task Force noted that the evidence on the effectiveness of both of these interventions for school-aged children and adolescents is limited.

2. Interventions that increase the price of tobacco products, on the basis of strong evidence of their effectiveness in reducing tobacco use in adolescents and adults, reducing population consumption of tobacco products, and increasing tobacco use cessation.

3. Mass media campaigns, on the basis of strong evidence of their effectiveness in reducing tobacco use in adolescents when combined with increases in tobacco prices, school-based education, and other community education programs.

4. Community mobilization combined with additional interventions (such as stronger local laws directed at retailers, active enforcement of retailer sales laws, and retailer education with reinforcement), on the basis of sufficient evidence of their effectiveness in reducing youth tobacco use and access to tobacco products from commercial sources.

The Community Preventive Services Task Force also recommends provider reminder systems, whether used alone or as part of a multicomponent intervention, across a range of intervention characteristics (such as chart stickers, checklists, and flowcharts) and in various clinical settings and populations.

Useful Resources

Primary care clinicians may find the following resources useful in talking with children and adolescents about the harms of smoking and other reasons not to start smoking: Centers for Disease Control and Prevention's Smoking & Tobacco Use: Information Sheet (www.cdc.gov/tobacco/youth/information_sheet/index.htm); U.S. Department of Health and Human Services' BeTobaccoFree.gov (http://betobaccofree.hhs.gov/dont-start/index.html); Public Health Service's (PHS) Treating Tobacco Use and Dependence: 2008 Update (www.ncbi.nlm.nih.gov/books/NBK63952/); and American Academy of Pediatrics' Tobacco Prevention Policy Tool (www2.aap.org

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/richmondcenter/TobaccoPreventionPolicyTool/TPPT_PracticeCessation.html). The USPSTF recommends that clinicians ask all adults about tobacco use and provide tobacco cessation interventions for those who use tobacco products (A recommendation). It also recommends that clinicians ask all pregnant women about tobacco use and provide augmented, pregnancy-tailored counseling for those who smoke (A recommendation) (9).

Other Considerations

Research Needs and Gaps

Few rigorous trials examine the effectiveness of primary care–relevant interventions (behavior, medication, or complementary medicine) to prevent tobacco use or to promote cessation of tobacco use in youth. More good-quality trials that replicate promising interventions; examine the effectiveness of specific intervention components and determine their feasibility in real-world primary care practice; incorporate longer-term outcomes; encourage equal baseline and outcome measures across studies; include other forms of tobacco use than cigarettes (such as smokeless or dissolvable tobacco); and include more diverse samples of children and adolescents with regard to demographic characteristics, various stages of initiation, and readiness to quit are needed.

For this population in particular, additional studies to improve understanding of the effectiveness of a clinician's referral to tailored, computer-based or electronic media channels that deliver messages about smoking cessation or remaining abstinent from smoking are needed.

Methodological issues that are related to tobacco prevention and cessation also merit additional research. These include the path to daily smoking and nicotine dependence of a child or adolescent, reliability and validity of self-reported measures, and use of biochemical verification in children and adolescents.

Discussion

Burden of Disease

Although purchasing tobacco products before the age of 18 years is illegal in the United States, 90% of American adults who have ever smoked on a daily basis reported that they smoked their first cigarette when they were younger than 18 years. Each day, more than 3800 children and adolescents aged 12 to 17 years smoke their first cigarette, and an estimated 1000 children and adolescents younger than 18 years begin smoking on a daily basis (1). Although most serious health effects from smoking occur in adulthood, children and adolescents can have negative respiratory effects, including impaired lung growth; early onset of lung function decline; and respiratory- and asthma-related symptoms, such as coughing and wheezing.

Scope of Review

The USPSTF reviewed the evidence on the effectiveness of primary care interventions on the rates of initiation or cessation of tobacco use in children and adolescents and on health outcomes, such as respiratory health, dental and oral health, and adult smoking. Included interventions targeted children, adolescents, or their parents; were delivered individually or in small groups in a health care or similar setting; had control groups that offered minimal or no treatment; and reported tobacco use prevalence or a similar outcome at least 6 months after the baseline assessment.

The USPSTF also reviewed the evidence on the potential harms of these interventions. Although the review was designed to examine all forms of tobacco use (including chewing tobacco, hookah smoking, and other forms of tobacco), all of the trials focused primarily or exclusively on cigarette smoking (1).

Effectiveness of Interventions to Change Behavior

No studies directly assessed the effectiveness of primary care–relevant interventions to prevent initiation of tobacco use on health outcomes in children and adolescents or subsequent rates of adult smoking. However, the USPSTF found 10 mostly fair-quality trials that included a behavior-based intervention to prevent smoking initiation in children and adolescents (1). Six of these trials focused exclusively on smoking prevention, and 4 trials combined smoking prevention and cessation and reported results separately for nonsmokers and smokers. Two studies were conducted outside of the United States.

The type and intensity of the interventions varied widely. Two studies were conducted in a primary care setting, and 2 were conducted in a dental setting. Six studies used primarily home-based interventions, including mailed materials and follow-up phone counseling. Interaction with a health provider ranged from 0 to more than 15 hours. Only the highest-intensity trial included group sessions and targeted multiple behaviors. Six of the 10 studies targeted youth directly, 3 included components for both youth and their parents, and 1 primarily targeted parents.

Self-reported smoking initiation was the primary outcome in all of the studies. However, how the trials defined smoking status at baseline and posttest varied considerably. For example, 3 studies assessed the percentage of baseline nonsmokers (defined as never smoking—not even 1 puff) who reported ever smoking (even 1 puff) in the past 30 days at posttest. One study assessed the percentage of baseline nonusers (defined as 30-day tobacco use or having ever used tobacco more than 100 times) who reported tobacco use in the past 30 days at posttest. One study reported the percentage of baseline nonsmokers (no smoking in the past 30 days) who reported smoking 1 or more cigarettes in the past 30 days at posttest. Several studies did not report specific measures but reported the number of children or adolescents who started smoking at posttest.

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Because of the intermittent nature of smoking in children and adolescents, biochemical tests are not useful in substantiating self-reported smoking status in this population. No studies used biochemical measures to confirm self-reported measures.

Results from a pooled meta-analysis of 9 trials (1 trial did not present adequate data and was excluded from the meta-analysis), which included 26 624 children and adolescents and examined smoking initiation in baseline nonsmokers, showed a statistically significant reduction in risk in youth who received the intervention at 6- to 36-month follow-up compared with the control group (risk ratio, 0.81 [CI, 0.70 to 0.93]). That is, behavior-based interventions reduced the absolute risk for smoking initiation at follow-up by 2%, resulting in a number needed to treat of 50 (1).

Potential Harms of Interventions to Change Behavior

No trials directly addressed harms of interventions. A potential harm of intervention is the initiation of smoking. Some trials reported higher absolute prevalence of smoking in the intervention group compared with the control group at follow-up. However, no trials reported a statistically significant difference between the groups (1).

Estimate of Magnitude of Net Benefit

Adequate evidence shows that individual and combination behavior-based interventions in primary care settings can reduce the risk for initiation of tobacco use in school-aged children and adolescents. Although evidence on harms of behavior-based interventions is insufficient, the USPSTF believes that the potential harms are small to none. The USPSTF concludes with moderate certainty that the net benefit of behavior-based interventions to prevent smoking in children and adolescents is at least moderate.

Response to Public Comments

A draft version of this recommendation statement was posted for public comment on the USPSTF Web site from 11 December 2012 to 7 January 2013. Most comments agreed with the recommendation statement. In response to several comments requesting clarification, the USPSTF revised the title to reflect that the USPSTF considered primary care–relevant interventions, clarified that it searched for evidence on other forms of tobacco use but only found evidence on cigarette smoking, enhanced the section on research gaps, and provided resources for primary care clinicians to help prevent tobacco use in children and adolescents.

Update of Previous USPSTF Recommendation

In 2003, the USPSTF concluded that the evidence was insufficient to recommend for or against routine screening for tobacco use or interventions to prevent and treat tobacco use and dependence in children or adolescents (I statement) (10). The USPSTF based its recommendation on the PHS 2000 clinical practice guidelines on treating tobacco use and dependence. The PHS guideline focused on treatment of tobacco use and limited its review on the effectiveness of tobacco use interventions to adolescent smokers. In this update, the USPSTF reviewed the benefits and harms of primary care–relevant interventions for tobacco use prevention or cessation in children and adolescents. However, the USPSTF emphasized the evidence on interventions to prevent tobacco use initiation in children and adolescents.

Recommendations of Others

The 2008 update of the PHS clinical practice guidelines (7) recommended that clinicians ask pediatric and adolescent patients about tobacco use and provide a strong message on the importance of total abstinence from tobacco use, provide counseling interventions to aid adolescent smokers in quitting smoking, and ask parents about tobacco use and offer them cessation advice and assistance to protect children from secondhand smoke.

In 2009, the American Academy of Pediatrics recommended that all pediatricians counsel patients as young as 5 years against initiating tobacco use and provide counseling on tobacco cessation. The American Academy of Pediatrics also recommends that pediatricians advise all families to make their homes and cars smoke-free (11).

Disclaimer: Recommendations made by the USPSTF are independent of the U.S. government. They should not be construed as an official position of the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.

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Potential Conflicts of Interest: Dr. Moyer: *Support for travel to meetings:* AHRQ. Disclosure forms from USPSTF members can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M13-1537.

Requests for Single Reprints: Reprints are available from the USPSTF Web site (www.uspreventiveservicestaskforce.org).

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Appendix: U.S. Preventive Services Task Force

Members of the U.S. Preventive Services Task Force at the time this recommendation was finalized‡ are Virginia A. Moyer, MD, MPH, *Chair* (American Board of Pediatrics, Chapel Hill, North Carolina); Michael L. LeFevre, MD, MSPH, *Co-Vice Chair* (University of Missouri School of Medicine, Columbia, Missouri); Albert L. Siu, MD, MSPH, *Co-Vice Chair* (Mount Sinai School of Medicine, New York, and James J. Peters Veterans Affairs Medical Center, Bronx, New York); Linda Ciofu Baumann, PhD, RN (University of Wisconsin, Madison, Wisconsin); Kirsten Bibbins-Domingo, PhD, MD (University of California, San Francisco, San Francisco, California); Susan J. Curry, PhD (University of Iowa College of Public Health, Iowa City, Iowa); Mark Ebell, MD, MS (University of Georgia, Athens, Georgia); Glenn Flores, MD (University of Texas Southwestern, Dallas, Texas); Francisco A.R. García, MD, MPH (Pima County Department of Health, Tucson, Arizona); Adelita Gonzales Cantu, RN, PhD (University of Texas Health Science Center, San Antonio, Texas); David C. Grossman, MD, MPH (Group Health Cooperative, Seattle, Washington); Jessica Herzstein, MD, MPH (Air Products, Allentown, Pennsylvania); Wanda K. Nicholson, MD, MPH, MBA (University of North Carolina School of Medicine, Chapel Hill, North Carolina); Douglas K. Owens, MD, MS (Veterans Affairs Palo Alto Health Care System, Palo Alto, and Stanford University, Stanford, California); William R. Phillips, MD, MPH (University of Washington, Seattle, Washington); and Michael P. Pignone, MD, MPH (University of North Carolina, Chapel Hill, North Carolina).

‡ For a list of current Task Force members, go to www.uspreventiveservicestaskforce.org/members.htm.

Appendix Table 1. **What the USPSTF Grades Mean and Suggestions for Practice**

Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer/provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer/provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer/provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the Clinical Considerations section of the USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

Appendix Table 2. **USPSTF Levels of Certainty Regarding Net Benefit**

Level of Certainty*	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by such factors as: the number, size, or quality of individual studies; inconsistency of findings across individual studies; limited generalizability of findings to routine primary care practice; and lack of coherence in the chain of evidence. As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of: the limited number or size of studies; important flaws in study design or methods; inconsistency of findings across individual studies; gaps in the chain of evidence; findings that are not generalizable to routine primary care practice; and a lack of information on important health outcomes. More information may allow an estimation of effects on health outcomes.

* The USPSTF defines *certainty* as "likelihood that the USPSTF assessment of the net benefit of a preventive service is correct." The net benefit is defined as benefit minus harm of the preventive service as implemented in a general primary care population. The USPSTF assigns a certainty level on the basis of the nature of the overall evidence available to assess the net benefit of a preventive service.