

Recommendations on behavioural interventions for the prevention and treatment of cigarette smoking among school-aged children and youth

Canadian Task Force on Preventive Health Care*

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Among Canadian youth, 18% have tried cigarettes, with the range increasing from 3% among children in grade 6 to 36% among youth in grade 12.¹ A person who starts smoking as a child or youth is less likely to quit later in life than someone who starts later.² Factors such as age, sex, the influence of friends and family, and the broader social environment of school and community are linked to a youth's decision to start smoking.³ Almost 90% of adult smokers first smoked tobacco by age 18.⁴

Health risks of tobacco smoking are well documented.⁵ Half of regular smokers will die prematurely, most often of cardiovascular and respiratory disease caused by smoking. Tobacco smoking is a precursor in more than 85% of incident cases of lung cancer in Canada and is linked to cancers of the respiratory system, upper digestive tract, bladder, stomach, kidney, pancreas and cervix, as well as leukemia.^{5,6}

The annual cost to Canada, including health care, law enforcement, and loss of productivity from disability and premature death, was estimated at \$17 billion in 2002.⁷

Scope

This guideline presents evidence-based recommendations on behavioural interventions for the prevention and treatment of tobacco smoking among children and youth (age 5–18 yr). The Canadian Task Force on Preventive Health Care has not made previous recommendations on this topic.

This guideline does not address use of smokeless tobacco products or e-cigarettes. Although the number of children and youth trying e-cigarettes is increasing, and one in five youth 15–19 years of age have tried them,⁸ e-cigarette interventions for smoking cessation were not considered because none have been approved for use by children and youth in Canada.

KEY POINTS

- Tobacco smoking by children and youth is a potentially reversible driver of disease in adulthood, but there is a lack of high-quality randomized controlled trials that have examined the benefits of prevention and treatment in primary health care settings.
- Available evidence suggests that providing brief information and advice may help to prevent and treat smoking among children and youth aged 5 to 18 years.
- No studies assessed the long-term effects (i.e., in adulthood) of preventing or treating tobacco smoking among children and youth.
- There is substantial variability in the characteristics of the prevention and treatment interventions identified in the literature search.

Methods

The Canadian Task Force on Preventive Health Care is an independent panel of clinicians and methodologists that develops recommendations on primary and secondary prevention in primary care (www.canadiantaskforce.ca). Development of this guideline was led by a work group of four members of the task force with support from scientific staff at the Public Health Agency of Canada. The work group established the key and contextual research questions, patient-important outcomes and analytical framework (Appendix 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161242/-/DC1).

The task force commissioned the McMaster University Evidence Review and Synthesis Centre to design and conduct an independent systematic review of the evidence of benefits and harms of nonpharmacologic interventions (behavioural, alternative or com-

plementary) relevant to Canadian primary care settings. In particular, the systematic review evaluated whether the interventions are effective in helping school-aged children and youth avoid smoking (prevention), achieve smoking cessation (treatment) and reduce future tobacco smoking in adulthood. The review also sought to identify any harms from the interventions.

Studies included in the systematic review reported on interventions targeting smoking of combustible tobacco products (primarily cigarettes) but not smokeless tobacco products or e-cigarettes. Pharmacologic (i.e., drug or nicotine-replacement therapy) and e-cigarette interventions for smoking cessation were not considered because none have been approved for use by children and youth in Canada.

The literature search was based on the search done for the 2012 US Preventive Services Task Force review on the same topic (Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161242/-/DC1),⁹ which has an AMSTAR (A Measurement Tool to Assess Systematic Reviews) rating for methodologic quality of 10/11.¹⁰ The US task force searched MEDLINE, PsycINFO, the Cochrane Central Register of Controlled Trials, the Cochrane Database of Systematic Reviews, PubMed and the Database of Abstracts of Reviews of Effects for English-language citations of studies of prevention interventions published from Jan. 1, 2002,

to Sept. 14, 2012, and studies of cessation interventions published from Jan. 1, 2009, to Sept. 14, 2012. Its search for studies of behavioural treatments was limited to randomized controlled trials (RCTs).

The task force updated the US Preventive Services Task Force's search from Jan. 30, 2012 to Apr. 15, 2015, using the same databases with the addition of Embase and including citations in English and French. The task force also performed a separate search for harms of treatment (harms of prevention were not examined) in the same databases and with the same dates as the other treatment searches, but without limits on study design. Thus, all study designs were included for harms. In addition, a manual search was conducted for recent on-topic systematic reviews to look for relevant primary studies not captured by the database search. Nine RCTs were included (Appendix 3, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161242/-/DC1). The complete research protocol¹¹ and systematic review¹² are available at www.canadiantaskforce.ca.

Interventions were categorized as either low intensity (i.e., one brief interaction with a health professional or provision of written materials) or high intensity (i.e., two or more interactions of any length with a health professional, or one long session such as a half-day or full-day workshop). Patient-important outcomes defined by the work group as critical included incidence of smoking (for prevention), smoking cessation (for treatment) and prevalence of tobacco use in adulthood (for prevention and treatment). Adverse effects, such as anxiety and discomfort, were considered as important (for treatment).

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system¹³ was used to determine evidence and strength of recommendations (Box 1). Detailed methods are available in Appendix 4 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161242/-/DC1).

Although task force methods require rating of outcomes by patients (or in this case, youth or parents) and members of the work group, the guideline protocol considered only outcomes identified in the 2012 systematic review done for the US Preventive Services Task Force.⁹ We did not conduct a full systematic review of the evidence on parental preferences or values. Neither youth nor clinician preferences were examined owing to resource limitations. Following the task force's standard methods (<http://canadiantaskforce.ca/methods/patient-preferences-protocol>), we collected input from parents on their preferences and values related to tobacco smoking, prevention and treatment for their children.¹⁴

We used a rigorous usability testing process (including interviews, focus groups and surveys) to develop knowledge translation tools targeting various end-user groups (e.g., clinicians and parents) to accompany the guideline (details are available at http://canadiantaskforce.ca/wp-content/uploads/2016/12/procedural-manual-en_2014_Archived.pdf). The guideline was reviewed and approved by the entire task force and underwent external review by stakeholders and content experts. The Feasibility, Acceptability, Cost and Health Equity (FACE) tool was used with organizational stakeholders to gain stakeholders' perspective on the priority, feasibility, acceptability, cost and equity of the recommendations (a description of the FACE tool is available from the authors upon request).

Box 1: Grading of recommendations

Recommendations are graded according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system.¹³ GRADE offers two strengths of recommendation: strong and weak. The strength of recommendations is based on the quality of supporting evidence, degree of uncertainty about the balance between desirable and undesirable effects, degree of uncertainty or variability in patient values and preferences, and degree of uncertainty about whether the intervention represents a wise use of resources.

Strong recommendations are those for which the Canadian Task Force on Preventive Health Care is confident that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation for an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation against an intervention). A strong recommendation implies that most individuals will be best served by the recommended course of action.

Weak recommendations are those for which the desirable effects probably outweigh the undesirable effects (weak recommendation for an intervention) or undesirable effects probably outweigh the desirable effects (weak recommendation against an intervention), but appreciable uncertainty exists. Weak recommendations result when the balance between desirable and undesirable effects is small, the quality of evidence is lower, or there is more variability in the values and preferences of patients. A weak recommendation implies that most people would want the recommended course of action but that many would not. Clinicians must recognize that different choices will be appropriate for each individual, and they must help each person arrive at a management decision that is consistent with his or her values and preferences. Policy-making will require substantial debate and involvement of various stakeholders.

Quality of evidence is graded as high, moderate, low or very low, based on how likely further research is to change the task force's confidence in the estimate of effect.

Recommendations

A summary of the recommendations is shown in Box 2. GRADE decision table summaries are in Appendix 5 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161242/-/DC1). Recommendations are based on the task force's evaluation of the strength and quality of evidence from RCTs of behavioural interventions (e.g., information and counselling) applicable to primary care settings. No evidence was found on alternative or complementary interventions.

Prevention

We recommend asking children and youth (age 5–18 yr) or their parents about tobacco use by the child or youth and offering brief information and advice, as appropriate, during primary care visits to prevent tobacco smoking among children and youth (weak recommendation, low-quality evidence).

The systematic review¹² identified seven RCTs^{15–21} that evaluated interventions designed to prevent tobacco smoking among children and youth who had not previously attempted smoking, or to prevent re-initiation among those who had previously smoked but not in the past 30 days. Children and youth randomly assigned to

Box 2: Summary of recommendations for clinicians and policy-makers

Prevention

We recommend asking children and youth (age 5–18 yr) or their parents about tobacco use by the child or youth and offering brief information and advice, as appropriate, during primary care visits† to prevent tobacco smoking among children and youth (weak recommendation, low-quality evidence).*

The recommendation for prevention interventions applies to children and youth 5 to 18 years of age who do not currently smoke tobacco, whether they have never smoked or are former smokers, and who do not have cognitive deficits, mental or physical health issues, or a history of alcohol or drug abuse.

Treatment

We recommend asking children and youth (age 5–18 yr) or their parents about tobacco use by the child or youth and offering brief information and advice, as appropriate, during primary care visits† to treat tobacco smoking among children and youth (weak recommendation, low-quality evidence).*

The recommendation for treatment interventions applies to children and youth 5 to 18 years of age who have smoked tobacco within the past 30 days and who do not have cognitive deficits, mental or physical health issues, or a history of alcohol or drug abuse.

*Contact time with primary care clinician of up to five minutes. Advice may include verbal communication about patient attitudes and beliefs, risks of smoking and strategies for dealing with the influence of peers. Sharing of printed or electronic material (e.g., brochures, newsletters and interactive computer programs) could also be considered.

†Appropriate primary care visits include scheduled health supervision visits, visits for vaccinations, medication renewal, episodic care or acute illness, and other visits where the primary care practitioner deems it appropriate. Primary care visits are completed in primary health care settings, including those outside of a physician's office (e.g., public health nurses carrying out a well-child visit in a community setting).

receive behavioural prevention interventions were 18% less likely than those in control groups to report initiation of smoking immediately after the intervention period or, in one study, three months after the intervention was completed ($n = 15\,545$; relative risk [RR] 0.82, 95% confidence interval [CI] 0.72–0.94; $I^2 = 26\%$). Absolute risk reduction was 1.92% (2 per 100 children; 9% in intervention groups, 11% in control groups). The number needed to treat to prevent 1 child from initiating smoking was 52 (95% CI 33–161). Results were similar for children aged 5–12 years (3 RCTs, $n = 3\,648$; RR 0.69, 95% CI 0.48–0.98; $I^2 = 0\%$) and youth aged 13–18 (6 RCTs, $n = 11\,898$; RR 0.87, 95% CI 0.78–0.96; $I^2 = 6\%$). No trials assessed long-term effects of the interventions on tobacco smoking in adulthood.

The characteristics of the interventions varied substantially across the prevention trials.¹² Some interventions involved no in-person contact (e.g., information was mailed), and others required up to 70 minutes with a health care professional. Some interventions targeted only children or youth, and others targeted the family. Interventions included different combinations of information, advice, education and counselling, and their duration ranged from 6 to 36 months (with different components of the intervention being delivered at different times). Although some studies were conducted in other types of settings (not primary care), the interventions were deemed to be applicable in a primary care setting (Appendix 3). Effects on preventing initiation or re-initiation of smoking were similar for low-intensity (3 RCTs, $n = 5\,146$; RR 0.75, 95% CI 0.61–0.92; $I^2 = 7\%$) and high-intensity interventions (4 RCTs, $n = 10\,399$; RR 0.88, 95% CI 0.77–1.02; $I^2 = 12\%$).

The Evidence Review and Synthesis Centre rated evidence on interventions to prevent tobacco smoking among children and youth as moderate quality. However, the largest trial (7500 participants and more than 900 incident cases) did not find a clinically meaningful or statistically significant effect, even though it applied a high-intensity intervention (RR 0.95, 95% CI 0.84–1.07),¹⁸ and the four trials with the fewest number of total initiation events reported the largest effects.^{15,16,20,21} In the opinion of the task force, one new adequately powered trial could change the overall effect estimate to be statistically nonsignificant if it does not show a meaningful risk reduction. It is also plausible that a similar trial could lead to an upward revision of evidence and recommendation strength if it does show a meaningful risk reduction. Given these issues, and because there was no evidence on tobacco smoking in adulthood, the task force assessed the overall quality of evidence supporting the prevention recommendation as low.

Treatment

We recommend asking children and youth (age 5–18 yr) or their parents about tobacco use by the child or youth and offering brief information and advice, as appropriate, during primary care visits to treat tobacco smoking among children and youth (weak recommendation, low-quality evidence).

The systematic review¹² identified three RCTs^{17,20,21} that focused on behavioural interventions for smoking cessation among

youth aged 13 and older who reported being smokers. Across trials, smokers were variably defined as having smoked at least one cigarette in the past 30 days, smoking “regularly” or “occasionally,” or smoking “more than weekly.” Relative to controls, youth who took part in cessation interventions were 34% more likely to report quitting smoking immediately after the intervention and, in one study, three months after the intervention was completed (RR 1.34, 95% CI 1.05–1.69; $I^2 = 0\%$). Absolute reduction in smoking was 8% (8 per 100 youth; 32% quit in intervention groups v. 24% in control groups). The number needed to treat to have 1 smoker quit was 13 (95% CI 6–77). The only trial that investigated effect by smoker category found benefit for self-reported “regular” smokers ($n = 448$; RR 2.06, 95% CI 1.40–3.04), but not for “experimental” smokers ($n = 140$; RR 0.91, 95% CI 0.65–1.29).¹⁷

As with preventive interventions, characteristics of treatment interventions differed substantially across the three RCTs.¹² No trials reported on treatment harms or smoking into adulthood. There were no RCTs of smoking cessation interventions among children aged 5 to 12 years, which is consistent with the low prevalence of smoking in this age group.

The Evidence Review and Synthesis Centre rated evidence on smoking cessation interventions among youth as moderate quality. However, the risk of bias for each of the three included trials was rated as unclear or high, and the 95% CI of the pooled estimate of treatment benefit ranged from very minimal to very large effect (5% to 69% quitting). In the opinion of the task force, one new adequately powered trial could change the effect estimates substantially in this context. Because of this, and because no evidence was found on prevalence of tobacco smoking into adulthood or treatment harms, the task force assessed the overall quality of evidence supporting the treatment recommendation as low.

Rationale

In the judgment of the task force, recommendations in favour of low-intensity behavioural interventions for the prevention and treatment of smoking among children and youth (age 5–18 yr) are warranted given the potentially moderate reduction in smoking initiation, the modest increase in the likelihood that youth will stop smoking, the similar size effect of low- and high-intensity interventions, the high likelihood that harms of preventive and treatment interventions are minimal, and that stakeholders find interventions important and acceptable.

The recommendations on prevention and treatment are based on limited evidence. Therefore, they are weak because of low certainty that the evidence reflects the true effect of behavioural interventions (for either prevention or treatment of smoking) and that the evidence of any benefit, if present, would be sustained or have longer-term health benefits.

Considerations for implementation

Primary care practitioners (e.g., family physicians and nurses) have procedures or guidance in place in the primary health care setting to assess the smoking risk or smoking status of children

and youth. If they determine that there may be a need for a preventive or cessation intervention, the primary care practitioner should ask if the child or youth, or parent or guardian, is interested in having a brief conversation that may help prevent the uptake of smoking or stop smoking.

The implication of a weak recommendation is that most children and youth and their parents or caregivers would want the recommended course of action, but many would not (Box 1). Clinicians must help each child or youth or family make a decision that is consistent with their values and preferences. Those who are concerned about the potential for a child or youth to start smoking, are interested in a small increase in the likelihood that a child or youth will not start smoking or will stop smoking in the short term with receipt of the intervention, and are less concerned about the lack of evidence on whether the intervention will reduce smoking into adulthood may choose to participate. Conversely, a parent may choose to decline on the basis of the limited evidence available or if the risk of their child smoking is low.

For those who agree to participate, primary care practitioners should offer them brief information and advice at appropriate primary care visits. Primary care practitioners who may deliver the intervention include family physicians, nurses or other appropriate members of the health care team. Brief information and advice may include verbal communication of up to five minutes to discuss patient attitudes and beliefs, risks of smoking, and strategies for dealing with the influence of peers. Sharing of printed or electronic material (e.g., brochures, newsletters and interactive computer programs) could also be considered. Appropriate primary care visits include scheduled health supervision visits, visits for vaccinations, medication renewal, episodic care or acute illness, and other visits where the primary care practitioner deems it appropriate. Primary care visits are completed in primary health care settings, including those outside of a physician’s office (e.g., public health nurses carrying out a well-child visit in a community setting).

The task force has developed a tool to help health care practitioners interpret these recommendations for patients and their families (available at <http://canadiantaskforce.ca/tools-resources/tobacco-2>).

Non-expert opinion from organizational stakeholders and health care professionals who participated in the external review process indicated that they believe the recommendations to be feasible, acceptable and affordable and would positively affect health inequities. The task force recognizes that not all those at risk of smoking will or will be able to access primary health care, and this is a consideration that policy-makers will need to address.

Values and preferences

To assess parental perceptions of the draft prevention and treatment recommendations, the task force recruited parents of school-aged children and youth (smokers and nonsmokers) to participate in a focus group ($n = 10$) and subsequent survey ($n = 13$).¹⁴ In general, parents agreed it is important to offer prevention and treatment interventions, but they would want to be

informed about the components of offered interventions. Some parents questioned primary care settings as the best place for behavioural interventions, given the time and expertise required and the availability of similar interventions delivered in other settings or by other health intervenors, such as peers or health educators.

Suggested performance measures

The Chronic Disease and Injury Indicator Framework has monitored the annual prevalence of daily smoking among youth aged 15–19 years in Canada since 2013.²² Tracking this indicator over time may help assess the implementation of this guideline and its potential benefits. However, not being able to determine the reasons for the change in prevalence is a limitation of this indicator.

Economic implications

The task force did not review the evidence on the economic implications of interventions in developing this guideline. However, low-intensity behavioural interventions for the prevention and treatment of smoking, such as offering brief information and advice, would be expected to have low resource implications.

Other guidelines

This guideline is consistent with those from most Canadian and international bodies (except for the New Zealand Ministry of Health) that recommend in favour of delivering preventive interventions for tobacco smoking. Similarly, all identified organizations recommend in favour of behavioural interventions to treat tobacco smoking in children and youth. The only organization that did not address treat-

Table 1: Summary of recommendations on interventions (behavioural and pharmacologic) for the prevention and treatment of tobacco smoking among children and youth from Canada and elsewhere

Organization	Recommendation	
	Prevention of tobacco smoking	Treatment of tobacco smoking
Canadian Task Force on Preventive Health Care (current)	Ask about tobacco use and offer brief information and advice, as appropriate, during primary care visits to prevent tobacco smoking among children and youth (age 5–18 yr).	Ask about tobacco use and offer brief information and advice, as appropriate, during primary care visits to treat tobacco smoking among children and youth (age 5–18 yr).
Canadian Paediatric Society (2016) ^{23,24}	Ask children, youth and families about tobacco use and exposure and provide age-appropriate information and counselling to prevent initiation as part of routine health care.	Offer counselling for smoking cessation. Stay aware of research on pharmaceutical cessation interventions for teens and adults and prescribe effective medications as indicated, in combination with counselling.
US Preventive Services Task Force (2013) ²⁵	Provide interventions, including education or brief counselling, to prevent initiation of tobacco use in school-aged children and adolescents.	Recommendations were not made for or against treatment.
Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-informed Tobacco Treatment (CAN-ADAPTT) (2011) ²⁶	Obtain information about tobacco use on a regular basis. Provide counselling that supports abstinence from tobacco to children and adolescents.	Provide counselling that supports tobacco cessation among children and adolescents who use tobacco.
American Academy of Pediatrics (2009) ²⁷	Screen for tobacco use and tobacco smoke exposure. Counsel children and parents about the harms of tobacco at most visits.	Provide advice to tobacco users about cessation strategies and resources at most visits.
New Zealand Ministry of Health (2014) ²⁸	No recommendation	Ask about and document every person's smoking status. Give brief advice to stop to every person who smokes. Strongly encourage every person who smokes to use cessation support (a combination of behavioural support and stop-smoking medicine works best) and offer to help them access it. Refer to, or provide, cessation support to everyone who accepts your offer.
US Institute for Clinical Systems Improvement (2013) ²⁹	Establish tobacco use status for all patients and reassess at every opportunity. Reinforce nonusers to continue avoiding tobacco products.	Recommend ongoing cessation services to all tobacco users.

ment for tobacco smoking in this age group was the US Preventive Services Task Force (Table 1).

Gaps in knowledge

Tobacco smoking is a potentially reversible driver of disease and health care costs, but there is a lack of high-quality RCTs that have examined the short- and long-term benefits of behavioural prevention and treatment interventions for children and youth in primary health care settings. More research is needed to identify the characteristics of the most effective interventions for smoking prevention and cessation, including factors such as the type of advice provided, the duration of the intervention, the type of provider and the contact time needed. There is no conclusive evidence on the potential harmful effects of e-cigarettes or whether they can be used in smoking cessation interventions for either adults or youth.⁸ This should be a research priority.

Better data on the values and preferences of children and youth on prevention and treatment interventions are also needed. This research should be a high priority for researchers, research funders and policy-makers. Smoking tends to be concentrated among youth who have alcohol or substance abuse issues or physical or mental health issues. However, because of these characteristics, the interventions could affect them differently. Further research is needed to assess the benefits and harms of applying preventive and treatment interventions in at-risk populations.

Conclusion

The evidence suggests that low-intensity behavioural interventions based on providing brief information and advice may help to prevent and treat tobacco smoking among children and youth. The task force therefore recommends that primary care practitioners consider offering such interventions to children and youth aged 5 to 18 years.

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