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. A person who starts smoking as a child or youth is less likely to quit later in life than someone who starts later. 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. Almost 90% of adult smokers first smoked tobacco by age 18.

Health risks of tobacco smoking are well documented. 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.

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.

Scope

This guideline presents evidence-based recommendations on behavioural interventions for the prevention and treatment of cigarette smoking among school-aged 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, 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-
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 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 protocol and systematic review 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) system 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. 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.

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. 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 review identified seven RCTs 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 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 = 15455; relative risk [RR] 0.82, 95% confidence interval [CI] 0.72–0.94; I² = 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 = 3648; RR 0.69, 95% CI 0.48–0.98; I² = 0%) and youth aged 13–18 (6 RCTs, n = 11898; RR 0.87, 95% CI 0.78–0.96; I² = 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. 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 = 5146; RR 0.75, 95% CI 0.61–0.92; I² = 7%) and high-intensity interventions (4 RCTs, n = 10399; RR 0.88, 95% CI 0.77–1.02; I² = 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), and the four trials with the fewest number of total initiation events reported the largest effects. 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 review identified three RCTs that focused on behavioural interventions for smoking cessation among children and youth who had smoked tobacco, whether they had 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.

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).

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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). 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. 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

<table>
<thead>
<tr>
<th>Organization</th>
<th>Prevention of tobacco smoking</th>
<th>Treatment of tobacco smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canadian Task Force on Preventive Health Care (current)</strong></td>
<td>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).</td>
<td>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).</td>
</tr>
<tr>
<td><strong>Canadian Paediatric Society (2016)</strong></td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td><strong>US Preventive Services Task Force (2013)</strong></td>
<td>Provide interventions, including education or brief counselling, to prevent initiation of tobacco use in school-aged children and adolescents.</td>
<td>Recommendations were not made for or against treatment.</td>
</tr>
<tr>
<td><strong>American Academy of Pediatrics (2009)</strong></td>
<td>Screen for tobacco use and tobacco smoke exposure. Counsel children and parents about the harms of tobacco at most visits.</td>
<td>Provide advice to tobacco users about cessation strategies and resources at most visits.</td>
</tr>
<tr>
<td><strong>New Zealand Ministry of Health (2014)</strong></td>
<td>No recommendation</td>
<td>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.</td>
</tr>
<tr>
<td><strong>US Institute for Clinical Systems Improvement (2013)</strong></td>
<td>Establish tobacco use status for all patients and reassest at every opportunity. Reinforce nonusers to continue avoiding tobacco products.</td>
<td>Recommend ongoing cessation services to all tobacco users.</td>
</tr>
</tbody>
</table>
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. 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.

**References**


27. Committee on Environmental Health; Committee on Substance Abuse; Committee on Adolescence; Committee on Native American Child Health. From the American Academy of Pediatrics: policy statement — Tobacco use: a pediatric disease. Pediatrics 2009;124:1474-87.


This article has been peer reviewed.

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Competing interests: None declared.

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Funding: Funding for the Canadian Task Force on Preventive Health Care is provided by the Public Health Agency of Canada. The views of the funding bodies have not influenced the content of the guideline. The views expressed in this article are those of the authors and do not necessarily represent those of the Public Health Agency of Canada.

Acknowledgements: The authors acknowledge the authors of the evidence review that supported this guideline (Leslea Peirson, Muhammad Usman Ali, Donna Fitzpatrick-Lewis, Meghan Kenny, Parminder Raina, Sharon Peck-Reid, Maureen Rice, Diana Sherifali and Rachel Warren, all at the McMaster Evidence Review and Synthesis Centre); Michèle Tremblay, Médecin Conseil, Institut national de santé publique du Québec; Jennifer O’Loughlin, Professor, Department of Social and Preventive Medicine, École de santé publique, Université de Montréal, and Canada Research Chair, Early Determinants of Adult Chronic Disease; Atul Kapur, Assistant Professor, Department of Emergency Medicine, University of Ottawa, (Physicians for a Smoke Free Canada); Richard S. Stanwick, Vancouver Island Health Authority (Canadian Paediatric Society); David Mowat, Senior Scientific Lead, Population Health, Canadian Partnership Against Cancer; Theo J. Moraes, The Hospital for Sick Children (Canadian Thoracic Society); Pierre-Paul Tellier, Associate Professor, Family Medicine, McGill University, (College of Family Physicians of Canada); Sue Curry, Dean, Distinguished Professor of Health Management and Policy, College of Public Health, University of Iowa; Donna Jepsen, British Columbia representative of Community Health Nurses of Canada; Michael K. Ong, University of California Los Angeles and VA Greater Los Angeles Healthcare System, (American College of Physicians); April S. Elliott, Chief, Division of Adolescent Medicine Alberta Children’s Hospital, and Clinical Associate Professor, Department of Paediatrics, University of Calgary; Catherine Donovan, Clinical Associate Professor of Public Health, Memorial University of Newfoundland, (Association of Faculties of Medicine of Canada); Bill Callery, Manager, Programs and Knowledge Exchange, Chronic Disease Prevention Alliance of Canada; Peter Selby, Professor, Departments of Family and Community Medicine and of Psychiatry, Dalla Lana School of Public Health, University of Toronto, and Clinician Scientist, Centre for Addiction and Mental Health; Anne-Claude Bernard-Bonnin, Clinical Professor of Pediatrics, CHU Sainte-Justine, Université de Montréal; Carrie Patnode, Kaiser Permanente Center for Health Research; Gilles Plourde, Drug Safety Unit — Director’s Office, Centre for Evaluation of Radiopharmaceuticals and Biotherapeutics, Biologics and Genetic Therapies Directorate, Health Canada; and Julie Greene and Susan Courage, Public Health Agency of Canada.

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