

Preventing smoking in children and adolescents: Recommendations for practice and policy



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Canada has witnessed a general decrease in smoking prevalence among all age groups in recent years. However, despite large numbers of campaigns and interventions, thousands of young Canadians continue to initiate cigarette smoking every year. The increasing popularity of alternative tobacco products and e-cigarettes is also creating new health challenges. Research has shown that the deleterious effects of nicotine and cigarette smoke are significant and long lasting. Health care professionals have key responsibilities in preventing tobacco use among youth and their families, and need to know more about effective smoking prevention and cessation strategies. Clinicians need to integrate tobacco counselling into health assessments of teenagers and be aware of the roles that families, communities and governments can play in promoting tobacco-free environments. Information, effective strategies and opportunities for health care professionals to intervene and advocate for Canadian adolescents are discussed.

Key Words: *Adolescents; Children; Counselling; Nicotine; Prevention; Smoking*

Cigarette smoking remains the number one preventable cause of death worldwide, killing almost six million people each year.⁽¹⁾ In 2013, 14.6% of Canadians >15 years of age (about 4.2 million people) were active smokers. About 15% of Canadian children are exposed to second-hand smoke in their homes.⁽²⁾

Canadian smoking rates have been steadily decreasing in all age groups since the early 1990s, but now seem to be stabilizing. Therefore, tobacco use and second-hand tobacco smoke exposure are still critical national health concerns. Smoking kills more than 37,000 Canadians each year – six times more than vehicle collisions, suicides, homicides and AIDS combined. Also, with the increasing popularity of electronic (e-)cigarettes, nicotine dependence remains an important and timely topic. For more information, see the CPS statement “E-cigarettes: Are we renormalizing public smoking?”: www.cps.ca/en/documents/position/e-cigarettes.

Strategies to prevent smoking initiation in children and adolescents are reviewed in the present position statement, with focus on interventions that can be performed in the health care setting. Approaches to managing smoking cessation in adolescents are discussed in the practice point “Strategies to promote smoking cessation among adolescents”, also published in this issue.

IMPORTANCE: PERSONAL AND PUBLIC HEALTH CONCERNS

It is well known that tobacco use increases the risk for contracting a variety of diseases and health conditions, including lung, bladder, colorectal, esophageal, kidney, larynx, mouth, throat and other

La prévention du tabagisme chez les enfants et les adolescents : des recommandations en matière de pratiques et de politiques

Ces dernières années, le Canada a connu une diminution générale de la prévalence de tabagisme dans tous les groupes d'âge. Cependant, malgré les multiples campagnes et interventions, des milliers de jeunes Canadiens commencent encore à fumer chaque année. La popularité croissante d'autres produits du tabac et de la cigarette électronique (vapeuse) engendre d'ailleurs de nouveaux enjeux en matière de santé. D'après les recherches, les effets délétères de la nicotine et de la fumée du tabac sont prononcés et persistants. Les professionnels de la santé ont un rôle essentiel à jouer pour prévenir le tabagisme chez les enfants, les adolescents et leur famille, et ils doivent mieux connaître les stratégies efficaces de prévention du tabagisme et d'abandon du tabac. Les cliniciens doivent intégrer les conseils sur le tabagisme à leur évaluation de santé des jeunes et être conscients du rôle des familles, des communautés et des gouvernements dans la promotion de milieux sans tabac. L'information que les professionnels de la santé doivent connaître, les stratégies efficaces qu'ils peuvent utiliser et les occasions d'intervenir et de défendre les intérêts des adolescents canadiens qu'ils peuvent saisir sont présentées.

cancers, respiratory infections, diabetes and coronary heart disease. Risk levels increase steadily with the number of packs of cigarettes smoked,⁽³⁾ along with cumulative toxic effects on microvasculature that contribute to hair loss, skin wrinkling and the risk for erectile dysfunction.⁽⁴⁾ The negative effects of tobacco use during pregnancy are discussed in the CPS position statement “Use and misuse of tobacco among Aboriginal peoples”: www.cps.ca/documents/position/tobacco-aboriginal-people.

Campaigns to inform the public of these risks, combined with smoking legislation regulating age of access and smoking in public places, have led to a general decrease in smoking prevalence among all age groups in Canada. Despite these efforts, thousands of young Canadians continue to take up smoking every year.

PRODUCTS AND PREVALENCE

The most recent data on tobacco use in Canadian provinces are based on national surveys conducted by Health Canada and Statistics Canada in 2013, which excluded the territories:⁽⁵⁾

- Smoking prevalence increased with age: 2% of youth in grades six to nine were smoking, 11% at 15 to 19 years of age, 18% at 20 to 24 years of age, and 19% at 25 to 34 years of age.
- Smoking rates in teens 15 to 19 years of age were two to three times lower than in 1999.
- Smoking rates among teens 15 to 19 years of age were highest in Quebec (13.9%) and lowest in Alberta (8.8%).

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TABLE 1
Alternative forms of tobacco

	Product names	Description	Comments
Smoked tobacco			
Cigar	Cigarillo, figurado	Variouly sized, tightly rolled bundle of tobacco wrapped in leaf tobacco	• Nicotine content may be up to four times that of a traditional cigarette
Hookah	Pipes, waterpipe, hubble-bubble, narghile, shisha	Lit tobacco smoke bubbles through water and is inhaled through a shared mouthpiece	• Use of black 'air-cured' tobacco increases risk of esophageal cancer • The filtering effect of water does not make smoking less dangerous • Increases risk of communicable disease (eg, herpes, tuberculosis) via the shared mouthpiece
Bidi		Hand-rolled, leaf-wrapped cigarette, often with sweet flavours (eg, chocolate or cherry)	• Nicotine content is three to five times that of a traditional cigarette
Kretek	Clove cigarette	Rolled mixture of tobacco, cloves and other additives	• Variable nicotine content
Smokeless tobacco			
Chewing tobacco	Chew, spit tobacco	Held in the mouth between gum and cheek. Three forms: Loose-leaf, 'plug' and 'twist'	• Associated with substantial risks for gum disease, mouth cancer and oral sores
Snuff	Pinch, dip	Finely ground tobacco (dry or moist). Dry snuff is usually inhaled through the nostrils; moist snuff is usually held in the mouth for absorption, similar to chewing tobacco.	• Risks similar to chewing tobacco
Snus		A form of moist snuff, dispensed in packets or sachets that are held in the mouth for absorption. Similar to chewing tobacco but designed so that spitting is not required.	• Nicotine content is two to six times that of a traditional cigarette
Dissolvable tobacco		Three forms: Strips (resembling breath-strips and placed on the tongue to freshen breath), sticks (resembling toothpicks), and orbs (similar to tic-tac candies)	• Delivers anywhere from one-half to three times the nicotine of a traditional cigarette • Dissolution from three minutes (strip) to 30 minutes (stick) • Allows for covert tobacco use, with risk of inadvertent toxic ingestion by young children • High content of un-ionized nicotine leads to rapid absorption, with potential for nicotine toxicity
Electronic cigarette	E-cigarette, vapor cigarette, electronic nicotine delivery system (ENDS)	Battery-powered device that provides doses of nicotine for inhalation. A nicotine or nonnicotine-containing liquid is put into the device in a cartridge or in drops Available in a variety of flavours	• Widely available from internet vendors • Health risks compared with traditional cigarette smoking and value as a smoking reduction/cessation aid are highly controversial • Potential for inadvertent nicotine poisoning leading to morbidity or mortality in children

Adapted from Sockrider M, Rosen JB. *Prevention of smoking initiation in children and adolescents (updated February 2016): www.uptodate.com/contents/prevention-of-smoking-initiation-in-children-and-adolescents, and information from the American Academy of Pediatrics Julius B. Richmond Center of Excellence website: www2.aap.org/richmondcenter/EmergingAltProducts.html*

- There were more male than female smokers (13.2% versus 8.1%). Both genders tended to smoke approximately the same number of cigarettes per day.
- Six out of ten smokers 15 to 19 years of age were seriously considering quitting in the next six months, and more than one-half (57%) had made an attempt to quit in the previous 12 months. These numbers have been relatively stable over the past 15 years.

It is also known from other sources that sexual minority youth (LGBTQ) and Aboriginal/Indigenous youth have smoking rates that are up to five times higher than other adolescents.(6,7)

Other forms of tobacco

While other forms of inhaled tobacco have been present for decades (Table 1), the recent increase in popularity of e-cigarettes is rapidly changing the way teenagers interact with tobacco products. The health risks of e-cigarettes compared with traditional cigarettes are not yet clearly known, but the potential for accidental nicotine poisoning in infants and young children is well established.(8)

Smokeless tobacco is often perceived as being 'safer' or less addictive than cigarettes by teenagers and adults alike, but a growing body of evidence contradicts such beliefs.(9) Some new forms of smokeless tobacco look like candy or 'breath-strips', making them attractive to children. Some alternative tobacco products actually deliver more nicotine than cigarettes, increasing the potential for addiction and nicotine poisoning. In addition to the health risks associated with tobacco smoking, smokeless tobaccos have a direct effect on the mouth, causing bad breath, dental problems, increased risk of ear, nose and throat cancers (eg, involving the lips, tongue, cheeks and throat) and leukoplakia.(10)

Alternative tobacco product use varies widely among provinces, ranging from 18% to 35% for cigarillos, 11% to 19% for cigars, 8% to 17% for water pipes and 6% to 11% for chewing tobacco.(5) The first national data set on e-cigarette use in Canada revealed that in 2013, 20% of youth 15 to 19 years of age had tried e-cigarettes, compared with 20.2% for traditional cigarettes. It is speculated that more teenagers will soon be smoking e-cigarettes than traditional cigarettes, a particularly worrisome possibility considering current

gaps in municipal, provincial/territorial and federal regulation for e-cigarette use and promotion.(11)

FACTORS CONTRIBUTING TO SMOKING INITIATION

Many factors contribute to smoking initiation in teenagers but the two leading contributors are access to tobacco and individual attitudes and beliefs about smoking, which often arise from the environment.

Access to tobacco

Current Canadian data reveal that although most smokers in grades six to nine obtain their cigarettes within their social network,(5) over one-quarter (28%) still buy their cigarettes at a store, despite legislation fixing the legal age to purchase cigarettes at either 18 or 19 years, depending on the province.

A higher proportion of youth smokers 15 to 18 years of age buy their cigarettes in stores themselves, while almost one-half (44%) receive them for free from family, friends or other people. Of note, a substantial percentage in this age group (16%) report getting their cigarettes from 'other' sources, which include cigarettes purchased from friends and contraband suppliers. In fact, in the 2006/2007 Youth Smoking Survey, 13% of daily smokers reported that their main source of cigarettes was contraband. Contraband sources account for 18% of cigarettes smoked daily by teens in Canada, with figures exceeding 25% in Quebec and Ontario.(12) In one Health Canada analysis, contraband cigarettes were shown to contain ingredients and a nicotine content similar to legal cigarettes.(13) Of particular concern is that contraband cigarettes are purchased at a lower cost (ie, minus the tax), rendering them more affordable for youth with limited financial means, and undermining legal controls, which are a proven method for reducing adolescent smoking.

Environmental risk factors

The two strongest factors associated with smoking initiation in children and adolescents are parental smoking and parental nicotine dependence.(14) Certain attitudes and beliefs related to cigarette smoking are also important predictors of smoking initiation,(15-22) along with independent factors listed in Table 2.

IMPACTS OF TEEN SMOKING

Nicotine addiction

Nicotine is a highly addictive substance and youth are particularly vulnerable to becoming addicts compared with adults. In fact, studies have shown that teenagers develop nicotine addiction at much lower levels of consumption than adults, making smoking cessation potentially more difficult for this population.(15) Many adolescents develop a higher tolerance to nicotine and experience withdrawal symptoms (signalling dependence) after only days or weeks of exposure.(23)

Early nicotine dependence is an important factor in determining which individuals become regular smokers after experimentation.(24) Interestingly, while some studies have demonstrated that adolescents usually experience less severe withdrawal symptoms than adults,(25) withdrawal symptoms can appear sooner, sometimes after smoking only a few cigarettes. Also, data from a 12-year Canadian longitudinal cohort investigation suggest that:(26)

- One-fifth of young adolescents who smoke weekly experience symptoms of nicotine dependence.
- Craving, which is often the first symptom of nicotine dependence, can emerge three months to four months after taking the first puff of cigarette smoke.
- About 18 months after smoking their first whole cigarette, one-quarter of young smokers have lost confidence in their ability to quit.

TABLE 2

Factors that increase risk of smoking initiation

Older age at time of parental smoking cessation (if parents are ex-smokers)(16)
Low socio-economic status(15)
Peer and family influence, including lack of parental support(14,17)
Misinformation about the health consequences of smoking(18)
Easy access to tobacco products(14)
Influence of marketing, exposure to tobacco promotions(14,19)
Previous experimentation(20)
Depression and mental health conditions(21)
Poor school performance(15)
Adverse experiences such as: <ul style="list-style-type: none"> • emotional, and physical or sexual abuse, • parental separation or divorce, • a household member who is substance abusing, mentally ill or incarcerated(22)
Substance abuse (smoking often precedes the use of illicit drugs)(15)

NICOTINE'S EFFECT ON THE ADOLESCENT BRAIN

Several studies looking at the impacts of early smoking initiation on the developing teenage brain have shown that nicotine induces persistent changes in neural connectivity in several brain areas, including the nucleus accumbens, the medial prefrontal cortex and the amygdala, all of which are involved with emotion regulation.(27) Adolescent smokers appear to be more sensitive to the rewarding effects of nicotine. They are also vulnerable to nicotine-elicited changes on synaptic interconnections, leading to higher risks for addiction and affective disorders in adulthood.(28)

Chronic nicotine use in adolescence has also been shown to induce epigenetic changes that sensitize the brain to other drugs and increase the risks for future substance use.(29) Important individual differences appear to exist, such that some adolescents are at higher risk than others for smoking initiation, maintenance and nicotine-related neurological effects.(30) Studies conducted in animals suggest that nicotine consumption in adolescence increases impulsivity and decreases attention performance in the long term.(31) Many questions remain unanswered but health care providers should inform young smokers that the effects of nicotine on the adolescent brain are deleterious and long-lasting.

CHRONIC ILLNESSES

Youth with a chronic illness often smoke despite their greater vulnerability to the adverse health effects of smoking. It is well known that smoking carries important and specific health risks, not only for young people with respiratory disorders such as asthma and cystic fibrosis, but also those with conditions such as sickle cell disease, cancer, diabetes mellitus and juvenile arthritis. Table 3 summarizes disease-specific health risks and can be used to guide counselling in youth with these conditions.

INTERVENTIONS THAT WORK

Smoking prevention in the primary care setting

Health care encounters in paediatric offices should include a screen for sources of tobacco exposure for every child seen. There is adequate evidence to recommend that primary care clinicians provide interventions, including education and brief counselling, to prevent initiation of tobacco use in school-age children and adolescents.(14,32) Counselling interventions can take many forms, including:

- Face-to-face encounters
- Phone interactions with a health care provider
- Providing printed materials in person, by mail, or by e-mail

TABLE 3
Disease-specific consequences of smoking in adolescents with chronic illnesses

Chronic illness	Potential disease-specific health consequences
Asthma	Increased frequency and severity of exacerbations, medication use, hospitalization and risk of respiratory arrest
Cystic fibrosis	Increased frequency and severity of bacterial lung infections and hospitalization; accelerated decline in lung function and lower nutritional status
Juvenile idiopathic arthritis	Greater disease severity, higher risks for cardiovascular disease and premature death, and exacerbation of osteopenia
Cancer	Greater risks from several cancer treatments, for respiratory infections when immunosuppressed, and exacerbated mucositis
Sickle cell disease	Increased risk of acute chest syndrome and possible increased risk of stroke
Diabetes mellitus	Accelerated cardiovascular and peripheral vascular disease, including atherosclerosis, retinopathy and nephropathy. Smoking increases the morbidity and mortality of type 1 diabetes by 50% to 75%.

Adapted from: Tyc VL, Throckmorton-Beizer L. Smoking rates and the state of smoking interventions for children and adolescents with chronic illness. Pediatrics 2006;118(2):e471-87 and additional sources cited in Sockrider M, Rosen JB. Prevention of smoking initiation in children and adolescents (updated February 2016): www.uptodate.com/contents/prevention-of-smoking-initiation-in-children-and-adolescents

- Guidance to computer applications or Internet sources that are known to be effective

Counselling can help counter or address an adolescent's attitudes, beliefs and knowledge about smoking and its consequences, especially when they are mistaken or influenced by social or environmental factors, such as tobacco marketing. Counselling can also strengthen the development of social competence and social skills, thus helping youth to decline cigarettes.

GUIDANCE FOR PARENTS AND FAMILIES

Smoking and exposure to second-hand smoke are harmful at all stages of life, starting before birth. Some health effects can last a lifetime, and parents and caregivers should be made aware of health risks and ways to reduce or avoid them. Guidance for parents and families must be personalized to age and context and provide messaging that is specifically meaningful for them. For prevention to be successful, the health care provider's focus should be family-centred. Rather than concentrating on preventing smoking initiation in a child or youth, consider informing parents about the positive effects of smoking cessation during pregnancy and the first years of their child's life.(16) Table 4 lists key elements to be included in a brief counselling intervention conducted with parents and youth. Emphasize the immediate negative effects of smoking when counselling children and adolescents, because long-term consequences tend to be less meaningful for younger age groups.

According to one Cochrane review published in 2015, there is evidence of moderate quality that family-based interventions have a positive impact on preventing smoking in children and adolescents.(33) Authoritative parenting, where parents show a strong interest in caring for their adolescent combined with rule-setting, is a key feature of effective interventions with this age group.

SCHOOLS AND COMMUNITIES

Another Cochrane review published in 2013 examined the effectiveness of school-based programs in smoking prevention.(34) The study demonstrated that school-based interventions were effective

TABLE 4
Counselling around the health effects of smoking in different age groups

Age group	Most compelling information
Parents	Risks associated with second-hand smoke on children and other household members: <ul style="list-style-type: none"> • Prematurity • Stillbirth • Sudden infant death syndrome (SIDS) • Effects on fetal brain development • Asthma, colds, pneumonia and ear infections (even when parents do not smoke indoors) • Acquired heart disease • Becoming smokers (even when parents tell children not to start) Long-term health risks: <ul style="list-style-type: none"> • Heart disease, chronic obstructive pulmonary disease, lung and other cancers • Infertility
School age (5 to 11 years)	Negative effects and consequences of smoking: <ul style="list-style-type: none"> • Bad breath • Yellow teeth • Harder to keep up during active games or sports • Smoking just a few times can get your body hooked so that it is harder to stop • Cigarettes are expensive. Smokers spend money on cigarettes that they could use for more fun things • Tobacco companies use ads to trick you into thinking that smoking is cool and safe • Smoking has long-term effects on health, including several types of cancer and heart attacks • It is illegal to buy cigarettes when you are underage
Adolescents	Immediate effects of smoking <ul style="list-style-type: none"> • Cosmetic effects (smell, bad breath, yellow teeth, early wrinkles) • Poorer endurance and athletic performance • Hacking coughs, more colds and pneumonias • You can get addicted to tobacco after smoking as few as 100 cigarettes • Cigarette smoking is expensive. The cost of buying one pack a day for a year could buy a used car (between \$1500 and \$3500) • When you smoke you might be 'under the influence' of marketing from tobacco companies Long-term health consequences: <ul style="list-style-type: none"> • Selected long-term health risks listed for parents (above) • Alternative forms of tobacco (eg, snuff, e-cigarettes) may not be safer than cigarettes • Smoking exposes friends and family (including babies) to harm from second-hand smoke

Adapted from Sockrider M, Rosen JB. Prevention of smoking initiation in children and adolescents (updated February 2016): www.uptodate.com/contents/prevention-of-smoking-initiation-in-children-and-adolescents

in reducing long-term smoking rates including, notably, an average 12% reduction in students who start to smoke compared with control groups. The most effective interventions targeted both social competence and social skills development (social influences). Studies that looked at information-only strategies, multimodal interventions (ie, combining initiatives within and

beyond school) or that target only social influences, did not show significant results.

One overview of community-based interventions to prevent smoking in young people concluded that the evidence supporting their effectiveness in reducing teen smoking initiation was weak. Nevertheless, there also appeared to be a significant positive short- and long-term impact on teen smoking initiation in a number of studies.(35)

GOVERNMENTS

There is growing evidence to support the effectiveness of government legislation and initiatives to prevent smoking initiation in young people.(15) In Canada, the Tobacco Act, passed in 1997, and its amendment, Bill C-32, passed in 2009, provide the basis for federal tobacco regulations.(36) Provincial/territorial regulatory laws and municipal regulations are also in force. Consensus is growing that some of the most effective measures to reduce teenage smoking rates are already mandated in Canada. They include:

- **High taxation rates:** Making tobacco products less affordable by raising taxes on tobacco products.(37)
- **Labelling disincentives:** Using explicit photos and smoking-associated health warnings on all tobacco products, packages and labelling.(38)
- **Restricted marketing and sales:** Banning point-of-sale displays, advertising to minors and the sponsorship of public events by tobacco companies.
- **Smoke-free spaces:** Smoking bans in public places such as schools, child care centres, workplaces, hospitals, restaurants, hotels and parks, as well as in public transportation and cars transporting minors.(39)

Increasing evidence also supports the effectiveness of mass media campaigns by governmental and nongovernmental agencies, including signage, advertising, social media and the Internet.(40) For optimal effectiveness, studies show that population-based interventions should be culturally appropriate and designed to appeal to minority groups, particularly Aboriginal youth(41) and the LGBTQ community, both of whom have higher than average smoking rates.(42)

RECOMMENDATIONS

To help prevent smoking initiation in young people, health care providers should:

- 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.

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- Use the '5A's' method to counsel smoking cessation. For details, see the practice point "Strategies to promote smoking cessation among adolescents", published in this issue.
- Stay aware of research on pharmaceutical cessation interventions for teens and adults and prescribe effective medications as indicated, in combination with counselling.
- Advocate for medical schools and residency programs to address smoking prevention and cessation as a part of their core curriculums.

Schools and communities should:

- Legislate bans on smoking for all school and public properties and enforce such laws among school personnel and public sector workers.
- Educate students and families on the negative health consequences of tobacco use as part of elementary and high school curriculums, and in tandem with public programming.
- Offer regular programs to screen and counsel for smoking cessation.

All levels of government should:

- Continue to adopt and enforce laws and regulations that limit tobacco access for minors, including e-cigarettes and alternative tobacco products.
- Legislate a universal ban on smoking in cars where youth younger than 18 years of age are passengers.
- Continue to regulate tobacco advertising and packaging, and specifically control newer tobacco products aimed at minors.
- Implement strict penalties for any establishment or individual selling contraband cigarettes.
- Make all tobacco products less affordable by taxing them prohibitively.
- Provide confidential access to and coverage for smoking cessation therapies, including medications under provincial/territorial health plans.
- Fund and encourage research on the effects of tobacco use in youth and into smoking prevention and cessation interventions that work.

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