Recommendations: Will the Tobacco and Vaping Products Act go far enough?

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ABSTRACT

E-cigarette use among adolescents and young adults in Canada is increasing. Potvin's (2016) editorial outlined the need for more evidence on e-cigarettes as a gateway to combustible cigarettes and their toxicity. Since then, new evidence has emerged supporting the gateway effect and establishing toxicity. Health Canada has reviewed the evidence and recently opted to regulate e-cigarettes, including prohibiting brick-and-mortar retail access for youth under 18 years of age. However, many online e-cigarette retailers exist, which increases adolescents' access to e-cigarettes and currently unregulated nicotine-containing refills. Recent evidence on the toxicity of particular compounds in e-cigarette refills has demonstrated how these compounds may be amplified by certain types of e-cigarette devices. The toxicity of e-cigarettes is not only of concern to the user but potentially a concern to the public as well. The message that e-cigarettes have a benign effect on users and the public needs to change and should be reflected in Health Canada's future regulations concerning the Tobacco and Vaping Products Act.

KEY WORDS: Electronic cigarettes; smoking; vaping; public health; health policy

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Potvin's 2016 editorial discussed the implications of two commentaries that took vastly different stances on the use of e-cigarettes in health organizations such as hospitals as part of broader harm reduction strategy.¹ Potvin noted that evidence about the role of e-cigarettes "in the initiation and consumption of regular cigarettes" and "the toxicity of inhaling secondary fumes" was lacking, making it difficult to come to any definitive policy recommendations about the use of these devices.¹ Recently, Health Canada announced plans to introduce the Tobacco and Vaping Products Act (TVPA). Many anticipate that the TVPA will regulate the promotion and sale of e-cigarette devices and e-liquids to adolescents as well as the manufacturing of e-cigarette products.² Although the TVPA represents a good first step, we submit that to protect the public's health the regulatory framework must go further, explicitly addressing online sales and the toxicity of e-liquid, and seeking to address concerns about the gateway effect.

E-cigarette use among adolescents and young adults in Canada has been increasing and is now more prevalent than cigarette use.^{2,3} While it is generally accepted that using e-cigarettes is safer than using combustible tobacco,² debates about the level and nature of the harm associated with e-cigarette use is ongoing.¹ Additionally, concerns about the extent to which e-cigarette use normalizes smoking (and therefore may increase combustible tobacco use) still exist.^{4,5} Recent cross-sectional and prospective cohort studies following primarily high school students suggest that e-cigarette users initiate smoking combustible cigarettes more frequently than non e-cigarette users,^{4–8} a phenomenon known as the gateway effect. Barrington-Trimis and colleagues, for example, discovered that individuals who use e-cigarettes have greater than 6 times the odds of trying their first combustible cigarette

compared to those who have never used an e-cigarette.⁴ Moreover, individuals classified as the least likely to become smokers actually had a greater probability of initiating combustible cigarette use if they tried e-cigarettes.⁴

Although factors influencing this gateway effect are not fully understood, through the TVPA Health Canada aims to regulate some of the known major contributing factors. This regulation includes, "restricting sales to youth, restricting certain flavours, like candy, that appeal to youth, and labelling and promotion of vaping products".² However, to adequately address and prevent the use of e-cigarettes by youth, the TVPA must do more.

For example, consider the regulation on the promotion or sale of e-cigarettes to those under 18 years of age in traditional retail settings (i.e., brick and mortar). This approach will not limit adolescents' access to e-cigarette devices from online sources. A US study found that teens are able to purchase e-cigarettes online with ease.⁹ The study tested the age verification safeguards on the websites of 98 vendors, and found that 95% of vendors sold the product to minors.⁹ To prevent youth from purchasing e-cigarettes, it is clear that focusing on brick and mortar retail stores is insufficient; the TVPA must also regulate the sale of e-cigarettes online. This needs to include measures requiring vendors and/or

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distributors to develop better age verification safeguards to prevent the sale of e-cigarettes to minors.

Another proposed component of the TVPA is to regulate the manufacturing of e-cigarettes.² Although the TVPA is vague on details, as the regulations are currently under development, there have been calls for Health Canada to regulate and scrutinize the contents of the refill e-liquids as well as the e-cigarette devices themselves. Currently, e-liquid use is unregulated, and there are concerns about how the toxicity of the liquid may impact users.^{10–13}

Some evidence suggests that e-cigarettes are not fulfilling their expected role as cessation devices to help smokers quit, but instead are leading to “dual use”.¹⁰ Toxicity concerns arise due to the high nicotine dose that results from use of both forms of nicotine delivery. Smokers tend to use e-cigarettes inside and cigarettes outside, which contributes to higher levels of nicotine in the blood.¹⁰ This is a problem because nicotine is a neurotoxin. Nicotine is particularly harmful in young people, as it impacts brain development.¹² In addition, nicotine can have an impact on chronic diseases such as cardiovascular disease, which becomes more pronounced as nicotine blood level concentrations rise.¹⁰ The adverse outcomes associated with nicotine toxicity are not limited to users, but can have an impact on people who breathe in vapour second-hand. Some research has shown that second-hand vapour leads to the same blood concentration of nicotine in a bystander as second-hand smoke.¹⁰ In light of this, e-cigarettes should be seen as equivalent to combustible cigarettes with respect to smoke-free policies. While there is a need for ongoing research and surveillance on the second-hand effects of vapour, until clear data are available, public health policy should err on the side of caution.

Health Canada has recognized that nicotine in e-liquids poses a particular risk to young children, and thus the TVPA will include measures requiring e-liquids to be in “child-resistant packaging to help protect children from nicotine poisoning”.² More than just packaging, it is critical that the TVPA regulate the nicotine content of e-liquids. Given nicotine’s addictive properties, manufacturers of e-liquids have an incentive to maximize nicotine content: the more addictive e-liquid is, the more consumers will purchase. Goniewicz and colleagues reported that 20% of e-liquids they tested contained 92%–104% more nicotine than stated on the bottle by the manufacturer.¹¹ In addition, many of the “nicotine free” e-liquids they tested contained 0.8–0.9 mg/mL of nicotine.¹¹ Considering the potential toxic effects of nicotine, Health Canada must strictly regulate and monitor the contents of e-liquid to ensure that they contain the quantity of nicotine advertised. Additionally, if e-cigarettes are to have any impact on cessation, Health Canada must also ensure that nicotine-free e-liquids are in fact nicotine-free.

Another important issue that must be addressed by the TVPA is the use of flavouring agents in e-liquids. Health Canada has indicated an intent to regulate certain flavours given their appeal to adolescents.² While initiation is an important consideration related to flavours, the TVPA should also address the toxicity of flavouring additives. Many flavoured e-liquids contain diacetyl, which adds a “buttery” or “creamy” flavour to the product. Diacetyl can cause irreversible obstructive lung disease.¹² The National Institute for Occupational Safety and Health (NIOSH) “has recommended an

8-hour time-weighted occupational exposure limit of 5 ppb” for diacetyl inhalation.¹² A study analyzing e-liquid products found that 92% of manufacturers had at least one product that contained diacetyl and that of 159 flavour products tested, 69.2% contained diacetyl.¹² The study also found that 47% of products tested contained enough diacetyl that the typical consumption of e-liquid by a vaper (approximately 3 mL per day) would result in exposure to diacetyl well above the upper limit prescribed by NIOSH.¹² Indeed, workers in a flavour manufacturing plant who inhaled ultrafine aerosol containing diacetyl were found to have lung disease.¹²

In addition to regulating the content of the e-liquids, the TVPA should regulate the e-cigarette devices. The device itself can magnify toxicity. High concentrations of formaldehyde-releasing agents tend to be a by-product of using an e-cigarette at the high voltage setting.¹³ The International Agency for Research on Cancer has identified formaldehyde as a group 1 carcinogen.¹³ Exposure to formaldehyde-releasing agents from e-cigarettes used at high voltage subjects the user to close to 5 times the amount of formaldehyde that 20 cigarettes would produce.¹³ Although exposure to formaldehyde is negligible if an e-cigarette is used at a low voltage,¹³ the more recent e-cigarette devices often provide higher voltage options.¹⁴ Another important consideration is the growing phenomenon of “vape modding”. This occurs when users modify an e-cigarette to increase the temperature of the heating element to increase vapour density.¹⁵ These unregulated “vape mods” have resulted in explosions and significant burns to the user.¹⁵ The TVPA should put a limit on the voltage and temperature options of e-cigarettes, and should consider limiting or restricting the sale of modifiable e-cigarettes.

CONCLUSION

Considering the emerging evidence about the potential harms of e-cigarettes, it is encouraging from a public health standpoint that Health Canada is seeking to regulate e-cigarettes through the TVPA. Restricting the promotion of e-cigarettes or banning their sale to individuals under 18 years of age, however, does not go far enough. To more comprehensively protect Canadian youth, Health Canada should consider strategies to restrict adolescents’ online retail access, regulate and monitor e-liquid (both nicotine content and added flavours), and regulate and monitor e-cigarette devices. These strategies can be accomplished by enacting strong regulations through the TVPA.

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RÉSUMÉ

L'utilisation des cigarettes électroniques par les adolescents et les jeunes adultes est en hausse au Canada. Dans un éditorial (2016), Louise Potvin faisait état du manque de données probantes sur la toxicité des cigarettes électroniques et sur leur fonction possible de porte d'entrée vers les cigarettes combustibles. Depuis, de nouvelles preuves ont confirmé cet effet de porte d'entrée et établi la toxicité des cigarettes électroniques. Après un examen de ces données probantes, Santé Canada a choisi récemment de réglementer les cigarettes électroniques, y compris en interdisant l'accès des jeunes de moins de 18 ans à ces produits dans les points de vente au détail traditionnels. Il existe cependant de nombreux détaillants de cigarettes électroniques en ligne, ce qui élargit l'accès des adolescents aux cigarettes électroniques et aux recharges contenant de la nicotine, qui ne sont pas réglementées à l'heure actuelle. Les preuves récentes de la toxicité de composés particuliers des recharges de cigarettes électroniques démontrent que ces composés peuvent être amplifiés par certains types de dispositifs. La toxicité des cigarettes électroniques n'est pas seulement préoccupante pour les utilisateurs, mais pourrait aussi l'être pour le public. Il faut changer le message selon lequel l'effet des cigarettes électroniques est bénin pour les utilisateurs comme pour le public; un nouveau message devrait figurer dans la réglementation future de Santé Canada en vertu de la *Loi sur le tabac et les produits de vapotage*.

MOTS CLÉS : Cigarettes électroniques; tabagisme; vapotage; santé publique; politique de santé