

E-Cigarettes: An Update

Cessation effectiveness: Encouraging news

A 2016 Cochrane Review involving 24 studies (11 new ones since the 2014 Cochrane Review) concluded that there is evidence that e-cigarettes help smokers to stop smoking in the long term. However, as with the previous Review, the authors' confidence in this conclusion remains low owing to the fact that just 2 randomized control trials (RCTs)—the gold standard of evidence—were eligible for inclusion. Although the trials were deemed to be at a low risk of bias and the other studies were well designed and conducted, there simply aren't enough of them yet to comprise a robust body of evidence. Encouragingly, the authors noted that both RCTs used first generation "cigalikes" which are known to be less effective than 2nd and 3rd generation e-cigarettes. If these poorly-performing products can assist smokers, it is anticipated that future studies involving e-cigarettes with better nicotine delivery may demonstrate better cessation effectiveness. Fifteen ongoing RCTs have been identified as candidates for inclusion in the next Cochrane Review.

A gateway to smoking?

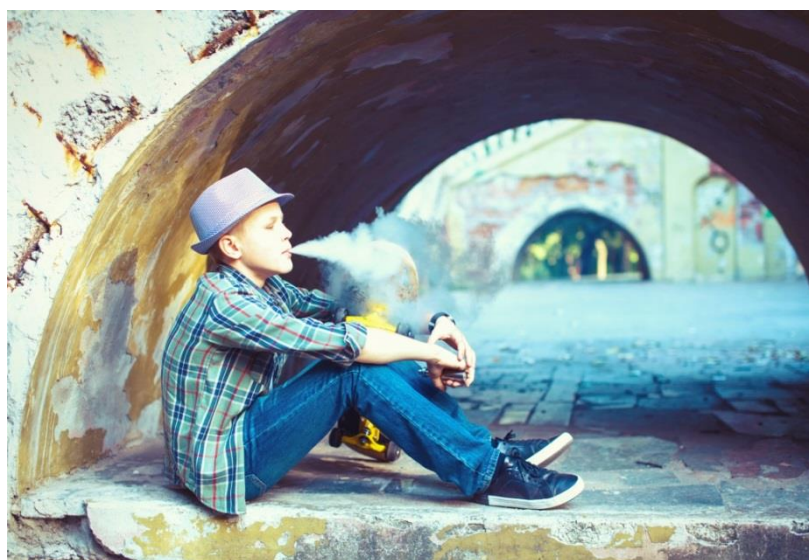
In the context of e-cigarettes, the gateway theory proposes that vaping nicotine could lead to addiction which in turn could lead to tobacco cigarette smoking among those who wouldn't have otherwise taken up cigarettes, independent of other risk factors. Nationally representative longitudinal data on smoking and vaping, which do not yet exist, would offer the best causal evidence for or against this theory.

Questions about e-cigarettes were added to Canada's national cross-sectional surveys in 2013 (Canadian Tobacco, Alcohol and Drugs Survey)

and 2014/2015 (Canadian Student Tobacco, Alcohol and Drugs Survey) and offer insight into e-cigarette and cigarette use in Canada. Results for CTADS suggest that less than 20% of experimentation is translating into regular e-cigarette use, which raises questions about the devices' feared gateway addictiveness. It should also be noted that the vast majority of Canadians reporting regular use of e-cigarettes are smokers and former smokers—regular use among non-smokers is rare. The release of subsequent survey data will better indicate if e-cigarettes are indeed playing a role in smoking uptake among youth and non-smokers in Canada.

National cross-sectional data on American middle and high school students spanning 5 years (National Youth Tobacco Surveys 2011 – 2015) suggest e-cigarettes are not a gateway to smoking: cigarette smoking rates continued to fall despite a significant increase in reported e-cigarette use. However, there are methodological issues with surveys on both sides of the border which make interpretation of the results difficult:

- Current use is defined as use, even just a puff or two, on at least one occasion in the past 30 days. Critics have pointed out that this measure is somewhat crude, as it captures experimentation, which would be more suitable in the "ever use" category. A better measure of current use would be use on at least one occasion in the past 7 days;



- The American survey and the CSTADS do not differentiate between e-cigarettes with and without nicotine, making it impossible to determine if children are becoming addicted to nicotine from e-cigarettes. However, the CTADS data indicate that over half of all Canadians who had recently used an e-cigarette vaped *without* nicotine. Further, another nationally-representative American survey found that 65-66% of youth in grades 8, 10 and 12 who reported vaping in the past 30 days were vaping flavouring only; and
- None of the surveys ask respondents for details about what types of e-cigarettes (first, second or third generation) they are trying or regularly using. This is critical—research shows that 2nd and 3rd generation models are better able to deliver nicotine to users. It is difficult to refute or affirm the gateway hypothesis when it is unclear if e-cigarette experimentation involves devices that can deliver enough nicotine and in such a way as to establish an addiction.

Health risks: Uncertainty remains

It will be several decades before any conclusions can be drawn regarding long-term health effects of e-cigarette use. With respect to short-term effects, the 2016 Cochrane Review assessed risks for up to 2 years and reported that the most common adverse events are mouth and throat irritation, which improve over time. Although researchers now agree that e-cigarettes pose substantially less risk to health than regular cigarettes, spirited debate continues regarding exactly how much less risk they carry. Earlier this year the UK Royal College of Physicians (RCP) released a report, *Nicotine Without the Smoke: Tobacco Harm Reduction*, citing a 95% safer estimate—the same estimate for which Public Health England was intensely criticized the year before. In contrast, a new report released by the World Health Organization (WHO) concluded that there is not enough research to quantify the relative risk of electronic nicotine delivery systems (ENDS) and electronic non-nicotine delivery systems (ENNDS) over cigarettes, and that no specific figure about how much safer they are can be given any scientific credibility.

Different countries, different approaches

The United Kingdom has embraced tobacco harm reduction and is actively endorsing e-cigarettes as smoking substitutes for smokers who can't quit with other methods. This position accepts that a percentage of the population will remain addicted to nicotine. The RCP report acknowledges that there could be risks associated with long-term nicotine use; however, it states that any long-term hazard is likely to be of minimal consequence compared to continued tobacco smoking. It is important to note that harm reduction in the UK complements its cessation strategy and is not a substitute for other proven measures.

In contrast, new Deeming Regulations in the United States enable the Food and Drug Administration (FDA) to regulate e-cigarettes as tobacco products. At great cost, all new products must be proven to be safer than cigarettes—a measure critics say favours Big Tobacco and will stifle innovation (NJOY has already filed for bankruptcy). The WHO's stance is similarly prohibitionist; its report acknowledges that nicotine is not a carcinogen but identifies it as a potential tumour promoter and implicates it in neurodegeneration. Children and adolescents, pregnant women, and women of reproductive age are warned against ENDS use and nicotine. The WHO only sees public health success in a 100% tobacco-free AND nicotine-free future.

Federal legislation coming soon

Health Canada has announced forthcoming amendments to the *Tobacco Act* to create a new legislative framework for regulating e-cigarettes. The government states the changes, to be introduced later this year, will balance the need to protect youth from nicotine addiction and tobacco use while allowing adult smokers to legally access vaping products for smoking cessation or as a potentially less harmful alternative to tobacco. This suggests Health Canada could be taking a somewhat less prohibitionist stance toward e-cigarettes than the United States and the WHO.