E-liquids and vaping devices: public policy regarding their effects on young people and health

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Knowledge about the composition and physiological effects of e-liquids is essential for assessing their effects on health

The popularity of electronic cigarettes (e-cigarettes) has surged in the past few years, and it is estimated that 1.2% of Australians now use them.[1] While the main premise in support of e-cigarettes is that they are safer for smokers than conventional tobacco products, a considerable proportion of users are, unfortunately, never-smokers or young people.[2,3] In 2020, about 3.6 million young people in the United States reported current e-cigarette use,[2] and in 2017, 14% of secondary school students in Australia were reported to have ever used e-cigarettes.[3]

In this issue of the *MJA*, Larcombe and colleagues report the concentrations of flavourings and toxins in 65 different brands of e-juice available in Australia.[4] The growth in popularity of e-cigarettes among young people is chiefly attributable to the successful marketing of easily concealable devices with attractive designs and a wide variety of appealing flavours, such as fruit, candy, and menthol.[2] Many chemicals used as flavourings are considered safe for human consumption via the gastrointestinal tract, but the effects of the vast majority on the respiratory system are unknown. Another consideration is that chemicals in e-liquids are altered by heating and aerosolisation, leading to further concerns about the effects of this cloud of unknown chemicals on the lungs. Finally, chemicals in e-liquids break down over time, again yielding a changing milieu of substances prior to inhalation.

In the US, the rapid growth in the use of flavoured e-cigarettes by young people has attracted the attention of federal authorities. This led to regulatory changes, including the Federal Drug Administration (FDA) banning the sale of fruit- and mint-flavoured cartridges in February 2020.[5] However, many e-cigarette users have subsequently switched to non-cartridge-based or disposable e-device products not covered by the FDA ban; in fact, the sales of disposable e-cigarettes with "kid-appealing flavours" has increased since February 2020 by almost 200%.[5] Also possibly linked with the ban is the 42% growth in sales of menthol-flavoured e-cigarettes between February 2020 and March 2021.[6] This is worrying, as Larcombe and his co-authors found that e-liquids labelled "Menthol" in Australia may instead contain potentially carcinogenic analogues.[4] Menthol analogues can increase free radical formation in e-cigarette aerosols, and may affect cell survival, proliferation, and inflammation, consistent with fears that inhalation of these chemicals could lead to lung damage and other detrimental health effects.[7]

The study by Larcombe and colleagues is directly relevant to e-cigarette users because the authors analysed locally available e-liquids, including the five best-selling flavours marketed by several companies.[4] By analysing the composition of popular e-liquids and identifying toxins and carcinogens and changes over time, studies such as this illuminate the potential health risks associated with vaping.

Nicotine-containing devices cannot legally be sold without prescription in Australia, and none have yet been approved for therapeutic use. But in response to increasing concerns about the health effects of both authorised and unauthorised vaping products, the Therapeutic Goods Administration has published the *Therapeutic Goods (Standard for Nicotine Vaping Products) Order* (TGO110), effective 1 October 2021.[8] The new order seeks to set minimum safety and quality requirements regarding labelling, packaging, and ingredients for devices exported from or imported into Australia. While a step in the right direction for quality control, the order allows up to 100 mg/mL nicotine,[8] much more than the United Kingdom limit of 20 mg/mL,[10] indicating that high nicotine vaping products are still permitted. Further, although the TGO notes that flavourings can be unsafe, specific guidance regarding toxin creation by the wide variety of available vaping devices is not provided. As a result, it is unlikely that the new standard will reduce vaping among young people.

Another problem is that most government funding in Australia is directed at perceptions of e-cigarettes and analysis of their use, rather than targeted research into their effects on health.[9] In the US, the FDA has tightened regulations and increased support for regulatory scientific investigations of e-cigarette devices and their impact, not only on public health but also at the level of the individual user.[11] Further studies of the regulations and research into the adverse health effects of vaping will

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provide new information that may allow public health officials to effectively curb e-cigarette use and to thereby reduce the risks associated with these e-devices.

Acknowledgements: Laura Crotty Alexander was supported by VA Merit, National Heart, Lung, and Blood Institute R01, and Tobacco-Related Disease Research Program pilot awards.

Competing interests: No relevant disclosures.

Provenance: Commissioned; externally peer reviewed. ■

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