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Summary report on use of e-cigarettes and relation to tobacco smoking uptake and cessation, relevant to the Australian context

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Scope and purpose

This document provides a summary of work conducted to date on a review of the health impacts of e-cigarettes, commissioned by the Australian Government Department of Health. This summary review includes content from the following reports:

1. Review of smoking prevalence and trends in Australia
2. Review of smoking prevalence and trends in the Aboriginal and Torres Strait Islander population
3. Review of evidence regarding changes in smoking behaviour with decreasing smoking prevalence, including that relating to the “hardening hypothesis”
4. Review of the patterns of e-cigarettes use
5. Systematic review of evidence regarding combustible smoking uptake in relation to e-cigarette use; and
6. Systematic review of evidence regarding the efficacy of e-cigarettes for combustible tobacco or nicotine cessation.

The findings presented here should be regarded as preliminary; many are in the process of undergoing peer-review or will undergo peer-review in the future. The next stage of the program of work is to review health outcomes in relation to e-cigarette use and to conduct a public health assessment of e-cigarettes for Australia; these will be completed by end June 2021.

Background

Despite world-leading tobacco control, smoking remains Australia’s leading cause of preventable disease and death, including for Aboriginal and Torres Strait Islander peoples. In many countries, e-cigarettes are explicitly or implicitly marketed as aids to smoking cessation and, among e-cigarette users, smoking cessation is a commonly reported reason for use. However, the substantial majority of smokers who quit successfully do so unaided and no e-cigarette products have been approved by the Australian Therapeutic Goods Administration as smoking cessation aids; the situation is similar in many other countries. In the context of the exceptional harms of combustible tobacco use and the current promotion of e-cigarettes it is important to review the current relevant evidence on e-cigarettes and smoking behaviour, to support informed decision-making.

Aims and methods

This report considers current contextual evidence regarding tobacco and e-cigarette use in Australia, and evidence on the relation of e-cigarettes on smoking behaviour. The findings presented here are based on systematic and narrative reviews of the relevant evidence from published papers and the grey literature, as appropriate.

Key findings

Smoking prevalence and trends in Australia

- From the 2019 National Drug Strategy Household Survey, 11.0% of people aged 14 and over in Australia were current daily smokers (equivalent to 2.3M people): a statistically significant drop from 12.2% in 2016, and following sustained reductions in smoking prevalence over recent decades. These falls were largely driven by younger people not taking up smoking.
- The proportion of never smokers has increased over time, in adults and particularly among youth in Australia. 96.6% of youth aged 14-17 in 2019 had never smoked, with youth never-smoking prevalence increasing five-fold between 2001 and 2016.
- The majority of Aboriginal and Torres Strait Islander people do not smoke. The prevalence of current daily smoking was 40.2% in 2018/19 in Aboriginal and Torres Strait Islander adults, following substantial and significant reductions over the past decade, particularly in major cities and regional areas and among younger adults and among youth.
- A copy of the **Review of evidence on the prevalence of and trends in cigarette and e-cigarette use by Aboriginal and Torres Strait Islander youth and adults** is available at <http://hdl.handle.net/1885/210569>.

“Softening” of the Australian smoking population over time

- Based on published reviews and large-scale repeat cross-sectional studies from Australia and similar high-income countries, declining smoking prevalence has generally been accompanied by increasing motivation to quit, reduced dependency and greater quit rates among smokers.
- In 2010, an estimated 2.0% of the general population of Australia aged 18 and over were smokers who were unmotivated to quit and had difficulty quitting.
- Based on the weight of the available evidence from Australian and similar high-income countries, the “hardening hypothesis” – proposing increasing difficulty quitting among the population of smokers as smoking prevalence declines – can be rejected. This concept should be replaced by the evidence-based conclusion that declining smoking prevalence is accompanied by “softening” of the smoking population, whereby smokers are, on average, more readily able to quit.
- A preprint copy of the **Review of evidence regarding attributes and behaviours of smokers as smoking prevalence falls, including evidence relevant to the “hardening hypothesis”** is available at <https://medrxiv.org/cgi/content/short/2020.09.16.20195560v1>

Patterns of use of e-cigarettes

- The prevalence of e-cigarette use varies widely between countries and has increased substantially in many countries over the past decade, particularly among young people. In countries where e-cigarettes are available as consumer goods, such as the United States, use is becoming common, particularly among youth, with recent data indicating 10-20% of US high school children report recent use of e-cigarettes.
- Among people in Australia aged 14 years and over in 2019, 11% had ever used e-cigarettes, most of whom (60%) reported using e-cigarettes once or twice only; 2.0% (equivalent to 412,000 people) reported current use (daily, weekly or monthly) and 1.1% (equivalent to 227,000 people) reported daily use, according to the 2019 National Drug Strategy Household Survey. Use has increased significantly over the last six years.
- Among people in Australia aged 14 years and over in 2016, 0.5% were estimated to be dual current users of e-cigarettes and combustible cigarettes, and 0.2% dual daily users; current e-cigarette use was reported by 4.4% of current combustible cigarette smokers, 1.5% using e-cigarettes daily.
- Population patterns consistent with short-term use of e-cigarettes for smoking cessation would predominantly include past use of e-cigarettes in ex-smokers, little ongoing use in current smokers and virtually no use in never-smokers.
- However, among current daily e-cigarettes users in 2016, 32% were also daily smokers, 11% were non-daily smokers, 38% were ex-smokers and 18% were never-smokers. Hence, an estimated 43% of daily e-cigarette users in Australia in 2016 were dual e-cigarette users and combustible tobacco smokers. In 2019, 1.9% of ex-smokers reported past use of e-cigarettes and 5.2% of never-smokers reported ever using e-cigarettes.

E-cigarette use in never- and former-smokers, and combustible tobacco smoking uptake

- Observational evidence from three systematic reviews and 25 primary research studies was included.
- A meta-analysis of data from these studies showed that never smokers who have used e-cigarettes were, on average, around three times as likely as those who have not used e-cigarettes to try smoking conventional cigarettes and transition to regular tobacco smoking. All studies found evidence of an increased risk, with wide variation in the magnitude of this risk.
- Where evidence on nicotine content was available, it indicated that a substantial majority of e-cigarettes in these studies delivered nicotine.

- The studies reviewed were observational in nature as it is not ethical or appropriate to randomise non-smokers to e-cigarette exposure. The quality of the evidence from the reviews and primary research studies was rated moderate overall.
- The limited available evidence indicates that former smokers who had used e-cigarettes were around twice as likely to relapse and resume current smoking as those who had not used e-cigarettes.
- A preprint copy of the paper: **E-cigarette use and combustible tobacco cigarette smoking uptake among non-smokers, including relapse in former smokers: umbrella review, systematic review and meta-analysis** is available at <https://medrxiv.org/cgi/content/short/2020.09.16.20195438v1>

The efficacy of nicotine-delivering e-cigarettes as an aid to smoking or nicotine cessation

- Reliable evidence on the efficacy of use of e-cigarettes for smoking cessation requires large-scale, independent randomised controlled trial (RCT) evidence from multiple studies.
- The randomised controlled trials identified found no significant difference in quit rates between smokers randomised to nicotine-delivering e-cigarettes versus no intervention or non-nicotine e-cigarettes, although point estimates of risk ratios were all above 1.00.
- Of the four trials of nicotine-delivering e-cigarettes versus other nicotine-replacement therapy identified, three found no statistically significant difference in smoking cessation between the groups and one found significantly greater cessation with nicotine-containing e-cigarettes than with other nicotine-replacement therapy.
- Data derived from three RCTs suggest that smokers randomised to nicotine-containing e-cigarettes versus other types of nicotine-replacement therapy were substantially more likely to be using any form of nicotine (i.e. e-cigarettes or nicotine-replacement therapy) at follow up. One study found that around 80% of successful quitters randomised to e-cigarettes continued to use them at one-year follow up while 9.0% of those randomised to other nicotine-replacement continued to use it.
- The overall quality of the evidence was rated as low and uncertain: the few RCTs conducted were generally small, employed a wide range of study designs across diverse settings and the majority had methodological issues indicating a high risk of bias.
- Overall, there is insufficient evidence that nicotine-delivering e-cigarettes are efficacious for smoking cessation, compared to no intervention, placebo existing nicotine-replacement therapy or other best-practice interventions. However, preliminary evidence highlights the potential for nicotine-delivering e-cigarettes to support cessation, and more reliable, large-scale evidence is needed.
- A paper based on this **systematic review of evidence on the efficacy of e-cigarette use for smoking and nicotine cessation** is currently being prepared for submission to a peer-reviewed journal.

Conclusions

- Overall, 11% of the Australian population aged 14 and over were current daily smokers in 2019, following continuing recent declines; this amounts to 2.3M smokers and it remains our number one cause of burden of disease. Large declines have also been seen among the Aboriginal and Torres Strait Islander population, although smoking prevalence remains high.
- Recent declines in smoking are largely driven by very low smoking uptake in younger people with 97% of 14-17 year olds in 2019 having never smoked.
- Decreasing smoking in the community, along with comprehensive tobacco control measures, has been accompanied by remaining smokers being more motivated to quit, less dependent on cigarettes and more readily able to quit – consistent with “softening” of the smoking population.
- The large majority of people successfully quitting smoking do so unaided or “cold turkey”.
- Use of e-cigarettes is uncommon but increasing in Australia. Most current daily e-cigarette users are current smokers of combustible tobacco and around one-fifth are never-smokers.
- Current patterns of use in Australia are largely inconsistent with short term use of e-cigarettes for smoking cessation. Patterns are more consistent with people using e-cigarettes in addition to combustible cigarettes, substitution of combustible tobacco smoking with e-cigarettes and uptake of e-cigarettes by people who have never smoked.
- Among people who have never smoked or are current non-smokers, those who use e-cigarettes are, on average, around three times as likely to take up smoking of combustible cigarettes as those who have not used e-cigarettes. This is consistent with a “gateway” effect. Former smokers who use e-cigarettes are more likely to relapse to current smokers.
- Currently, there is insufficient evidence that nicotine-delivering e-cigarettes are a more effective smoking cessation aid than no intervention, non-nicotine e-cigarettes, or standard nicotine-replacement therapy. Similar conclusions have been reached by major recent national and international reports reviewing this evidence.
- Current evidence suggests that nicotine-delivering e-cigarettes can result in prolonged exposure to nicotine through ongoing exclusive e-cigarette use or dual use with combustible cigarettes.