



Smoke and mirrors: is vaping useful for smokers who cannot quit?

KEY PRACTICE POINTS:

- Vaping devices work by heating a liquid, with or without nicotine, to produce an aerosol to inhale; devices are legal in New Zealand but are not approved products for smoking cessation, and they are not subsidised
- When discussing smoking cessation, recommend and prescribe approved and subsidised products and refer people to a behavioural support service
- If smokers enquire about vaping, they can be informed that it may help them to quit, and is likely to substantially reduce their health risks compared to smoking. They may need to trial different strengths of nicotine and flavours of vaping liquids in order to find one which helps them quit.
- Smokers who use vaping products should be encouraged to switch completely to vaping and stop smoking cigarettes, as even low rates of smoking are harmful; the nicotine content of the vaping liquid should be progressively lowered and then vaping also ceased
- If smokers switch entirely to vaping and no longer smoke cigarettes, they can be classified as ex-smokers in their medical records. Clinicians should record in a patient's notes if they are vaping.
- Strongly encourage non-smokers not to start vaping, particularly young people

There are many approved and fully subsidised medicines that clinicians can recommend to smokers who wish to quit. The evidence shows that a combination of pharmacological treatment and behavioural support results in the best outcomes for smoking cessation. However, despite this, some smokers still find it difficult to quit and are turning to other methods such as vaping. Vaping is not an approved smoking cessation method, but health care professionals are likely to be asked about it, and can provide information to help smokers make an informed choice.

What is vaping?

Vaping devices consist of a tank or cartridge containing a liquid, a heating coil, battery and inhalation pipe (Figure 1). They work by heating the liquid to produce an aerosol, or vapour, that is inhaled.¹

Vaping devices are also known as e-cigarettes or electronic nicotine delivery systems. However, vaping is the preferred term as unlike cigarettes they are not burnt and vaping does not necessarily deliver nicotine.² Recently, tobacco manufacturers have developed devices which heat, rather than burn, tobacco, but these are not vaping devices (see: "Heated tobacco products").



Figure 1: An example of a vaping device

Heated tobacco products

Heated tobacco products, also known as “heat not burn” products, are a relatively new invention from tobacco manufacturers. They are likely to become more widely available in New Zealand after a recent court ruling that they can be imported and sold here.⁶

Heated tobacco products are handheld electronic devices, but unlike vaping products they contain tobacco which is heated to release nicotine. Heated tobacco products deliver many of the same toxic and carcinogenic substances as cigarette smoke; although these substances are in lower quantities than in conventional cigarettes, heated tobacco products are still likely to pose a health risk.⁷⁻⁹

Nicotine intake from vaping varies

The liquids used in vaping devices typically contain a mix of water, flavourings and humectants, such as propylene glycol and vegetable glycerine.³ Propylene glycol is a constituent of synthetic smoke, e.g. as used in nightclubs and at concerts.³ A wide variety of flavours are available, including flavours which aim to emulate the taste of tobacco.

Vaping liquids are available in a range of nicotine concentrations, including liquids without nicotine. Nicotine levels obtained from vaping are highly variable, and depend on the liquid used, the vaping device the liquid is heated in, and the way in which the user operates the device.⁴ Studies show that people who are experienced with using a vaping device can obtain a nicotine intake comparable to that from ordinary cigarette smoking.⁵


Approved smoking cessation aids and behavioural support remain the best option for smokers

A number of approved, subsidised smoking cessation aids are available in New Zealand, including:

- Nicotine replacement therapy (NRT) such as patches, gum or lozenges
- Bupropion
- Varenicline, subject to Special Authority approval
- Nortriptyline

Evidence shows that approved smoking cessation aids in combination with behavioural support help the highest percentage of smokers to quit.¹⁰

When discussing smoking cessation, it is often necessary to address misconceptions about the risks associated with NRT, and explain that it is the method of delivery of nicotine (i.e. smoking cigarettes) that poses the greatest risk, rather than nicotine itself (see: “Misconceptions about nicotine”).

 For further information on:

- Helping patients to quit smoking, see: www.bpac.org.nz/BPJ/2015/October/smoking.aspx
- Tailoring messages to high risk groups, see: www.bpac.org.nz/BPJ/2014/October/smoking-cessation.aspx

If smokers cannot quit, switching to vaping is preferable

If asked about vaping, health care professionals can explain that it is not an approved or recommended method of smoking cessation, but it may help smokers to quit if other attempts have failed, and will be less harmful to their health than continuing smoking. Smokers may need to trial different

strengths of nicotine and flavours of vaping liquids in order to find one which helps them quit. Ideally, vaping should be viewed by smokers as an interim measure with the goal of quitting smoking and subsequently also quitting vaping. Behavioural smoking cessation support should be continued.

Vaping devices are not approved smoking cessation aids but may help some people to quit

Vaping has entered into public use as a consumer product, and no vaping devices are approved by Medsafe as smoking cessation aids. Vaping devices and liquids are not subject to the same regulatory assessments for safety that would be required of an inhaled medicine. For example, manufacturers of medical devices are required to inform Medsafe of alterations to their products, but the components included in vaping liquids or the design or manufacture of vaping devices are not subject to the same oversight.

There are few randomised controlled trials assessing the effectiveness of vaping as a smoking cessation aid, and the majority of published data come from observational studies or reports from smoking cessation services. The data suggest that vaping may help people to quit smoking by approximately the same extent as approved nicotine replacement therapy (NRT) products.^{5,12} For example, in one clinical trial conducted in Auckland, over 650 smokers were randomised to vaping with nicotine-containing liquids, vaping without nicotine, or using nicotine replacement patches. After six months, rates of smoking cessation were similar for all three groups with between 4–7% of participants remaining continuously abstinent.¹⁴

Smokers who switch to vaping with nicotine-containing liquids are more likely to quit

Vaping using liquids containing nicotine appears to be slightly more effective at helping smokers to quit than using liquids without nicotine: out of 1,000 people, approximately 53–64 more will manage to quit smoking by vaping using nicotine-containing liquids compared to liquids without nicotine (number-needed-to-treat [NNT] of approximately 15–20).^{15,16}

Smokers who wish to try vaping can be given advice to begin with a higher strength nicotine-containing liquid. The nicotine strength should then be gradually reduced, until nicotine is no longer required. Vaping should then be ceased.

Smokers who begin vaping should stop using cigarettes

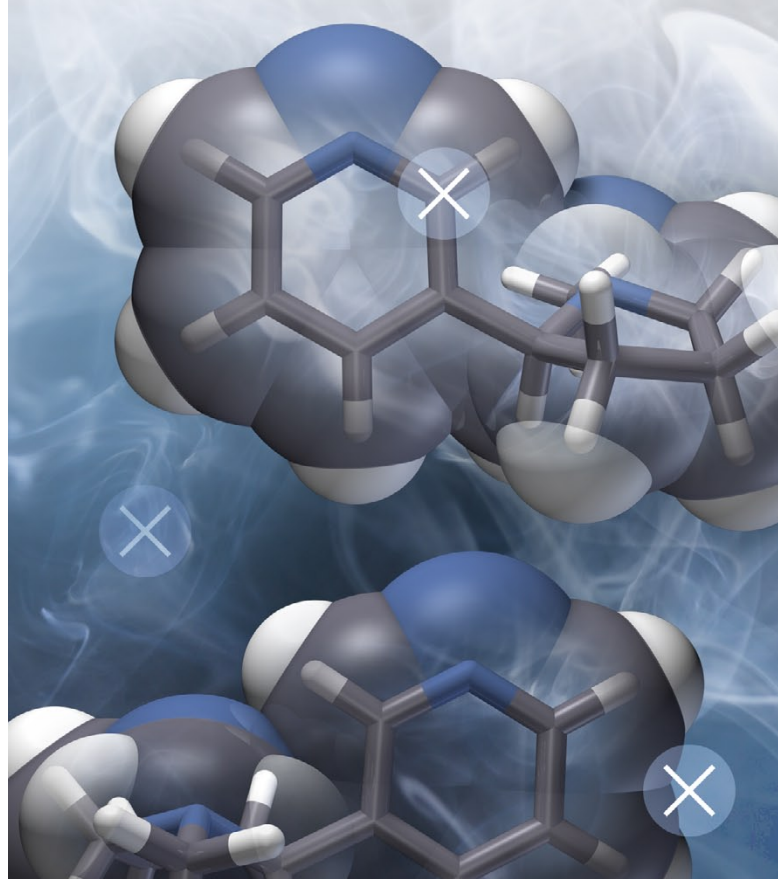
The majority of studies have found that smokers who begin vaping reduce the number of cigarettes they smoke.^{12,17} For example, in the study conducted in Auckland, participants randomised to vaping products smoked five to ten fewer cigarettes per day.¹⁸ Smoking fewer cigarettes will lead to a lower exposure to toxic and carcinogenic substances in tobacco smoke. However, smokers should be encouraged to quit

Misconceptions about nicotine

Although nicotine is addictive and drives continued smoking, the principal cause of smoking-related morbidity is the complex mix of combustion products from tobacco, such as particulate matter and tar, carbon monoxide, ammonia, formaldehyde, benzene, acrolein and toluene.^{5,11} Inhalation of the over 7000 chemical constituents of cigarette smoke causes cancers, cardiovascular and respiratory diseases through a variety of mechanisms.^{5,11}

It is therefore important to address any misconceptions about nicotine with smokers who wish to quit, and reassure them that using nicotine-containing products such as NRT poses a significantly reduced risk to their health. Surveys conducted in New Zealand and overseas show that there is confusion over the risks associated with smoking, smoking cessation aids and vaping with many people believing it is the nicotine content which is harmful:

- Just over half of adults agreed that NRT was safer than smoking¹²
- Four out of every ten current or ex-smokers believed that nicotine in cigarettes was the cause of most smoking-related cancer¹²
- Only 38% of people agreed that vaping was safer for health than smoking¹³



altogether as evidence shows that even low levels of smoking or low exposures, such as via second hand smoking, are associated with significantly increased health risks compared to not smoking.^{19, 20} For example, a 2018 meta-analysis found that people smoking 20 cigarettes per day had 2.3 to 4 times the risk of coronary heart disease or stroke as non-smokers. In comparison, people smoking one cigarette per day had 1.7 to 2.2 times the risk of non-smokers.²⁰

Vaping is likely to be substantially less harmful than smoking

Current medical consensus in the United Kingdom and United States is that vaping is likely to be substantially less harmful than smoking.^{5, 12, 21} For example, a review by Public Health England concluded that vaping is likely to be 95% less harmful than smoking.¹²

In New Zealand, the Ministry of Health considers that vaping could contribute to achieving smokefree targets and reduce health inequities, although this is dependent on how many people use vaping to help them quit smoking and how many people use vaping as an avenue into smoking (see: "Vaping products should only be used by smokers").⁶

Non-smokers should be strongly encouraged not to start vaping. However, current evidence suggests that very few non-smokers regularly use vaping devices.⁶

Pregnant women should avoid vaping. The effects of vaping during pregnancy on fetal development have not been sufficiently studied, however, evidence from animal studies suggests it may be associated with some harm.²² Smoking should also be avoided during pregnancy.

Aerosol from a vaping device contains fewer and lower levels of toxic components than cigarette smoke

In studies conducted to date, vaping aerosol has been found to contain fewer and lower levels of the carcinogens and toxic components of tobacco smoke.⁵ For example, toxic components such as formaldehyde, acetaldehyde and toluene, are present in vaping aerosol in quantities 9 to 450 times lower than in cigarette smoke.⁵ A recent review by the Royal College of Physicians in the United Kingdom concluded that under normal use the levels of toxins in vaping aerosol would "probably be" well below designated thresholds for occupational exposure.³

The flavourings used in vaping liquids are also used to flavour foods and are considered safe for oral ingestion, however, the risks associated with inhaling them as a vapour are unclear.³ Current opinion is that this is the most likely aspect of vaping to pose a future health risk, although the extent of risk is unknown.³ For example, some vaping liquids were previously found to contain diacetyl, which is a cause of bronchiolitis obliterans, also known as popcorn lung, in people

Vaping products should only be used by smokers: strongly encourage non-smokers not to start

There have been concerns that the marketing of vaping products could encourage non-smokers to begin vaping, particularly young people. To date, evidence from New Zealand and overseas has found the majority of people who use vaping products are smokers or ex-smokers, with few young people taking up vaping.^{5, 12, 26} Among adolescents in New Zealand aged 14–15 years surveyed in 2016, 15% had tried vaping at some point, however, the majority of this group reported vaping less than once a month.²⁶ It is illegal in New Zealand to sell vaping products to people aged under 18 years.²⁷

Clinicians should encourage non-smokers not to initiate vaping as although the long-term health effects are unclear, it is likely to be associated with some degree of harm.¹² Nicotine is the main factor contributing to the addictive potential of cigarettes and non-smokers who begin vaping with nicotine-containing liquids place themselves at risk of becoming addicted.



subject to high workplace exposures of this chemical. Although reports suggest manufacturers have removed diacetyl from vaping liquids, and there was no direct evidence of harm, vaping products are not subject to regulation and other risks may arise if changes to vaping liquids or devices occur in the future.¹²

Smokers who switch to vaping have short-term improvements in health

The most common short-term adverse effects associated with vaping include mouth and throat irritation, a dry cough of mild to moderate severity, anxiety, insomnia and depression.¹⁷ Short-term studies have found that smokers who switch to vaping have improvements in markers of cardiovascular risk, lung function and symptoms of respiratory disease. These include reduced blood pressure, fewer exacerbations of chronic obstructive pulmonary disease (COPD) and improvements in asthma symptoms.¹ Biomarkers of exposure to carcinogens in cigarette smoke are reduced in smokers who switch exclusively to vaping, i.e. do not continue to smoke as well as vape, and it is expected that this would translate to a reduced risk of cancer.¹⁴ Smokers also rate their own health as improved when they switch to vaping.⁵ The long-term health effects of vaping are currently unknown.

Smokefree laws do not currently apply to vaping

The legal ban on smoking indoors does not currently apply to vaping products, however, this may change.⁶ Levels of nicotine and particulate matter in the air from vaping are lower than from cigarette smoking and there is currently no available evidence on the potential long-term health effects of second-hand inhalation of vaping aerosol.^{5,23}

Ask smokers who switch to vaping to consider people around them and avoid vaping in situations or locations where the vapour will be a nuisance to others. Practices can decide whether to include vaping in their workplace smokefree policies.⁶

People who vape can be recorded as ex-smokers

Smokers who fully switch to vaping can be classified as ex-smokers in their medical notes once they have not smoked a cigarette for 28 days.^{24,25} The key factor determining coding of smoking behaviour is whether a person smokes cigarettes, not whether they are using nicotine, e.g. NRT products or vaping.²⁵ People who continue to smoke cigarettes while using vaping products should remain classified as current smokers.²⁴

Clinicians should record in a patient's notes if they are using vaping products, in order to monitor for any adverse effects of vaping that may become apparent in the future.

Summary: how to incorporate advice on vaping into smoking cessation discussions

For smokers who are considering vaping, health care professionals can highlight that:^{5,12}

- The adverse health effects associated with smoking primarily derive from inhaling tobacco smoke, not the nicotine content of cigarettes
- Vaping is less harmful than smoking but unlikely to be without harm; the long-term effects are unknown and products are not regulated
- Vaping may help them to quit smoking
- Vaping costs less than smoking, but NRT or smoking cessation medicines can be prescribed to them fully subsidised
- It is likely that they will derive the most benefit from using nicotine-containing vaping liquids and gradually reducing the strength until they no longer require nicotine, at which point vaping should be stopped
- Vaping devices should be kept away from children due to the risk of nicotine poisoning from ingestion of vaping liquids
- Behavioural smoking cessation support should be continued

Patient information: stop smoking services

A list of local stop smoking services is available at:
www.smokefree.org.nz/help-advice/stop-smoking-services

Contact Quitline by:

- Calling **0800 778 778**
- Texting **4006**
- Visiting their website: <https://quit.org.nz/>

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References:

1. Glasser AM, Collins L, Pearson JL, et al. Overview of electronic nicotine delivery systems: a systematic review. *Am J Prev Med* 2017;52:e33–66. doi:10.1016/j.amepre.2016.10.036
2. Technical Expert Advisory Group: Electronic Cigarette Product Safety. Electronic Cigarette Technical Expert Advisory Group minutes 26 October 2017. Ministry of Health NZ Available from: www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/vaping-smokeless-including-heated-tobacco/electronic-cigarette-technical-expert-advisory-group (Accessed Aug, 2018).
3. Royal College of Physicians. Nicotine without smoke: Tobacco harm reduction. 2016. Available from: www.rcplondon.ac.uk/projects/outputs/nicotine-without-smoke-tobacco-harm-reduction-0 (Accessed Aug, 2018).
4. Goniewicz ML, Kuma T, Gawron M, et al. Nicotine levels in electronic cigarettes. *Nicotine Tob Res* 2013;15:158–66. doi:10.1093/ntr/nts103
5. National Academies of Sciences and Engineering. Public health consequences of e-cigarettes. 2018. Available from: www.nap.edu/catalog/24952/public-health-consequences-of-e-cigarettes (Accessed Aug, 2018).
6. Ministry of Health. Vaping, smokeless, including heated tobacco. Ministry of Health NZ 2018. Available from: www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/vaping-smokeless-including-heated-tobacco (Accessed Aug, 2018).
7. Farsalinos KE, Yannovits N, Sarri T, et al. Carbonyl emissions from a novel heated tobacco product (IQOS): comparison with an e-cigarette and a tobacco cigarette. *Addiction* 2018; [Epub ahead of print]. doi:10.1111/add.14365
8. Pacitto A, Stabile L, Scungio M, et al. Characterization of airborne particles emitted by an electrically heated tobacco smoking system. *Environ Pollut* 2018;240:248–54. doi:10.1016/j.envpol.2018.04.137
9. Auer R, Concha-Lozano N, Jacot-Sadowski I, et al. Heat-not-burn tobacco cigarettes: smoke by any other name. *JAMA Intern Med* 2017;177:1050–2. doi:10.1001/jamainternmed.2017.1419
10. Ministry of Health. The New Zealand guidelines for helping people to stop smoking. 2014. Available from: www.health.govt.nz/publication/new-zealand-guidelines-helping-people-stop-smoking (Accessed Aug, 2018).
11. Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion (US), Office on Smoking and Health (US). How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US) 2010. Available from: www.ncbi.nlm.nih.gov/books/NBK53017/ (Accessed Aug, 2018).
12. Public Health England. Evidence review of e-cigarettes and heated tobacco products 2018. Available from: www.gov.uk/government/publications/e-cigarettes-and-heated-tobacco-products-evidence-review (Accessed Aug, 2018).
13. Health Promotion Agency. Preliminary analysis on 2016 Health and Lifestyles Survey (HLS) E-cigarette questions. Available from: www.hpa.org.nz/research-library/research-publications/preliminary-analysis-on-2016-health-and-lifestyles-survey-hls-e-cigarette-questions (Accessed Aug, 2018).
14. Bullen C, Howe C, Laugesen M, et al. Electronic cigarettes for smoking cessation: a randomised controlled trial. *Lancet* 2013;382:1629–37. doi:10.1016/S0140-6736(13)61842-5
15. El Dib R, Suzumura EA, Akl EA, et al. Electronic nicotine delivery systems and/or electronic non-nicotine delivery systems for tobacco smoking cessation or reduction: a systematic review and meta-analysis. *BMJ Open* 2017;7:e012680. doi:10.1136/bmjopen-2016-012680
16. Hartmann-Boyce J, McRobbie H, Bullen C, et al. Electronic cigarettes for smoking cessation. *Cochrane Database Syst Rev* 2016;9:CD010216. doi:10.1002/14651858.CD010216.pub3
17. Liu X, Lu W, Liao S, et al. Efficiency and adverse events of electronic cigarettes: A systematic review and meta-analysis (PRISMA-compliant article). *Medicine (Baltimore)* 2018;97:e0324. doi:10.1097/MD.00000000000010324
18. O'Brien B, Knight-West O, Walker N, et al. E-cigarettes versus NRT for smoking reduction or cessation in people with mental illness: secondary analysis of data from the ASCEND trial. *Tob Induc Dis* 2015;13:5. doi:10.1186/s12971-015-0030-2
19. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The health consequences of smoking - 50 years of progress: a report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US) 2014. Available from: www.ncbi.nlm.nih.gov/books/NBK179276/ (Accessed Aug, 2018).
20. Hackshaw A, Morris JK, Boniface S, et al. Low cigarette consumption and risk of coronary heart disease and stroke: meta-analysis of 141 cohort studies in 55 study reports. *BMJ* 2018;360:j5855. doi:10.1136/bmj.j5855
21. Royal College of Physicians. E-cigarettes inquiry. RCP London 2017. Available from: www.rcplondon.ac.uk/guidelines-policy/e-cigarettes-inquiry (Accessed Aug, 2018).
22. Li G, Saad S, Oliver BG, et al. Heat or burn? Impacts of intrauterine tobacco smoke and e-cigarette vapor exposure on the offspring's health outcome. *Toxics* 2018;6:43. doi:10.3390/toxics6030043
23. Protano C, Manigrasso M, Avino P, et al. Second-hand smoke generated by combustion and electronic smoking devices used in real scenarios: Ultrafine particle pollution and age-related dose assessment. *Environ Int* 2017;107:190–5. doi:10.1016/j.envint.2017.07.014
24. Ministry of Health. Electronic cigarettes: information for health care workers. 2016. Available from: www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/vaping-smokeless-including-heated-tobacco (Accessed Aug, 2018).
25. Ministry of Health. Definitions of smoking status. 2015. Available from: www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/tobacco-control-information-practitioners/definitions-smoking-status (Accessed Aug, 2018).
26. Health Promotion Agency. E-cigarette use among 14 and 15 year olds: Results from the 2016 Youth Insights Survey. Available from: www.hpa.org.nz/research-library/research-publications/e-cigarette-use-among-14-and-15-year-olds-results-from-the-2016-youth-insights-survey (Accessed Aug, 2018).
27. Ministry of Health. Vaping products - information for stop smoking services. 2018. Available from: www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/vaping-smokeless-including-heated-tobacco (Accessed Aug, 2018).



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