What are electronic cigarettes?

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Credit: AI-generated image (disclaimer)

As rates of smoking fall in Australia, electronic cigarette manufacturers are moving in. Liberty Flights last week released an (awful) online ad to "create awareness" of electronic or e-cigarettes in the Australian marketplace.

Meanwhile, competitor Gamucci has opened the world's first e-smoking lounge at Heathrow Airport.

E-cigarettes aren't available for sale in Australia but can easily be purchased online. So, what are they? And what does the evidence say about the harms and benefits of using them?

The basics

E-cigarettes are battery-operated units that vapourise fluids into such fine particles that they can be inhaled deep into the lungs.

There are many different types of e-cigarettes. Those that contain nicotine in cartridges or refill fluids (sometimes referred to as e-juice) are often marketed as "nicotine delivery devices".

Others are marketed as electronic cigarettes even when they contain no nicotine. Instead, moistening agents such as propylene glycol or vegetable glycerin are inhaled, along with flavourings such as sugar and alcohol.

E-cigarette devices produce no real smoke and are sold as devices that can be used anywhere because there's no risk of second-hand or passive smoking. It's unclear, however, whether "vaping" has second-hand effects, particularly if the fluids contain nicotine.

How do they work?

When e-cigarettes contain nicotine, the drug ostensibly passes across the lung's respiratory ducts and into arterial blood, much like nicotine from burnt tobacco, straight to the brain.

The effects of nicotine on the brain are profound in some people but affect others very little. It acts like a neurotransmitter substance and enhances the release of many others, such as dopamine and serotonin.

This makes it a very effective mood-altering substance.

Because nicotine is quickly excreted, it needs to be replaced very frequently (often 20 times per day) or users suffer withdrawals. Some experts, therefore, consider e-cigarettes to be a better alternative to smoking cigarettes, as they provide cleaner nicotine delivery.

For e-cigarettes containing nicotine in the cartridges or refills, there is some debate about whether much of the drug is delivered into the depths of the lung, equivalent to smoking. Studies have shown significant nicotine plasma levels within five minutes of use, suggesting they have a neurologically rewarding effect – just like smoking conventional tobacco. Other studies, however, say little nicotine is absorbed.

Some researchers have shown that user technique – breath holding, deep inhalation, and so on – varies the amount of nicotine absorbed, much like the way smokers drag on a tobacco cigarette.

Other experts, however, suggest the rewarding effects may be purely placebo. With or without nicotine, e-cigarettes seem to have some effect on smoking tobacco, either by immediate total conversion from tobacco cigarettes to e-cigarettes (maintaining the nicotine dependence, if they contain nicotine) or by substituting cigarettes for e-cigarettes and then weaning off them.

E-cigarettes seem to be as effective as nicotine products such as gums or patches in helping people quit smoking altogether.

Potential harms

With such a wide variety of e-cigarettes on the market, poor regulation and no quality control, it's difficult to make a clear assessment of their safety.

Researchers have exposed cells, animals and humans to refill fluids and aerosol vapours but have so far found little evidence that e-cigarette vapour is toxic. Cigarette smoke was found to be more cytotoxic, or cell-destroying.

A 2012 study from the United States, however, found there are cytotoxic chemicals in the refill fluids not related to nicotine that may be harmful to embryonic cells. This translates to a serious risk in using these products in pregnancy (and potentially during breast feeding).

One of the dangers of smoking tobacco is the inhalation of carbon monoxide (CO) and particulate matter. CO is responsible for complicated thickening of the blood and can lead to heart attacks. Particulate matter is inhaled pieces of rubbish from the burnt leaf, cigarette paper and bits of filter that land deep into the lungs and are the primary cause of the respiratory problems related to smoking tobacco.

But there is no evidence that CO or any particulate matter is inhaled with e-cigarettes.

Other concerns about inhaling nicotine via e-cigarettes are that they increase users' heart rate but the increase is similar to that of cigarette smokers.

A better alternative?

Over the next few years, we'll see more studies of e-cigarettes and their medical effects. But given the limited adverse side-effects reported to date, many experts conclude e-cigarettes are a safer option for smokers.

Cancer Council Victoria and University of Melbourne Professor Ron Borland has suggested that, though it is better not to use any form of nicotine long term: "…health professionals should be able to suggest to

smokers who are unable or unwilling to use or continue to use effective aids to quit, and are interested in e-cigarettes, that these are a better option than continuing to smoke."

But it's important to note that the nicotine contained in these devices comes from the tobacco plant and the profits still go to big tobacco.

Some tobacco control researchers fear the growing advertising, internet accessibility and other forms of marketing are reminiscent of the tobacco industry, creating a new growing market where smoking e-cigarettes is seen as cool.

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