

Are electronic cigarettes and e-liquids safe?



Health

There is limited information available about how safe electronic cigarettes are. The products available in Australia use a wide variety of parts and are sourced from many different manufacturers, including overseas manufacturers where safety and quality controls are unknown.^[1]

There are concerns among health experts about the safety of electronic cigarettes and liquids because of unregulated doses of nicotine, other chemicals used in e-liquids, exposure to particulate matter and the safety of the electronic cigarette devices themselves. The limited available evidence shows that the safety of electronic cigarettes, liquids and aerosols cannot be guaranteed for users and other people who are exposed to them.

Nicotine in electronic liquids

Note: The sale and possession of unapproved electronic cigarettes and e-liquids containing nicotine is currently illegal in NSW. Read the [Are Electronic Cigarettes Legal in NSW?](#) fact sheet for more information. There are currently no electronic cigarettes and e-liquids containing nicotine that have been approved by the NSW Ministry of Health.

Nicotine is a chemical which occurs naturally in tobacco leaves. Nicotine is a highly addictive substance.^[2, 3]

Nicotine has a wide variety of short and long-term harmful effects on a person's health. Short-term effects include symptoms such as increased breathing rate, increased heart rate and increased blood pressure.^[4-6] Long-term use of nicotine has been linked to harmful effects on reproductive health, including effects on the development of unborn babies' lungs as well as adolescent brain function and development.^[6] Nicotine can be inhaled, swallowed or absorbed through the skin.

Nicotine, other than for therapeutic use (such as approved nicotine replacement therapy) or in tobacco cigarettes, is classified as a Schedule 7 dangerous poison under the National *Standard for the Uniform Scheduling of Medicines and Poisons*.^[7] Read the [Are Electronic Cigarettes Legal in NSW?](#) fact sheet for more information.

Because liquids used in electronic cigarettes are unregulated and e-cigarettes and liquids are often not accurately labelled, it is hard to know exactly how much nicotine you are inhaling when using electronic cigarettes. Some e-liquids that do not list nicotine on the label have been found, after scientific testing, to contain nicotine. Tests of e-liquid samples collected by NSW Health in 2013 showed that 70 per cent of the samples contained high levels of nicotine even though the label did not state nicotine as an ingredient. As a result, NSW Health released a public health warning in October 2013 to inform the public about the risks of e-liquids that contain nicotine. The warning is available on the [NSW Health website](#).

If a person has a high dose of nicotine, it could lead to poisoning. Symptoms include dizziness, nausea, vomiting, abdominal pain, diarrhoea, slowing of the heart and breathing rate and in extreme cases, death.^[5, 6] Smokers build up a tolerance to nicotine through continued use, however people exposed to nicotine for the first time may experience mild symptoms of nicotine poisoning.

If liquids that contain nicotine are swallowed, it could be lethal. There have been anecdotal reports of harm to children who have swallowed liquid nicotine in Australia. A death was reported overseas in May 2013.^[8] The growing use of e-cigarettes has been linked to an increase in calls to poison centres. It has been reported that calls to Poisons Centres in Australia have increased from two in 2009 up to 54 in 2013.^[9] In the United States, calls to poison centres about potential e-cigarette poisonings increased from 1 per month in September 2010, to 215 in February 2014.^[10]

The dose of nicotine which people receive from smoking tobacco cigarettes is too low to cause nicotine poisoning. Nicotine replacement therapy (NRT) products, such as patches, gums, lozenges, sublingual tablets or inhalers are safe if used according to the product directions. These products have been thoroughly tested for their effectiveness in helping people to quit smoking and are approved by the Therapeutic Goods Administration. For more information on NRT products, please visit the [iCanQuit webpage](#).

Particulate matter in electronic cigarettes

Use of electronic cigarettes exposes the user, as well as other people in the same indoor space, to particulate matter from electronic cigarettes.

Particulate matter, also known as PM or particle pollution, is a term that describes very small solid particles and liquid droplets (aerosols) suspended in the air. Research has shown that using electronic cigarettes produces particulate matter.^[11-15]

People are exposed to particulate matter by breathing in the particles. There is good evidence that exposure to PM increases the risk of developing a range of harmful diseases, including lung diseases (such as asthma), and heart disease. Short term exposure (for a few days) can worsen already existing illnesses, while longer term exposure (for years) can increase the risk of developing a range of harmful diseases and shorten a person's life expectancy.^[16-20]

There is currently no known safe level of exposure to particulate matter which does not affect a person's health. This means that reducing exposure to particulate matter is beneficial for health.^[13, 14]

Other chemicals in electronic cigarettes

Electronic cigarettes and vapours can contain many harmful substances. Some of these may not be stated by the manufacturer on the label or elsewhere. Some of the substances which have been found in electronic cigarettes include propylene glycol, glycerine, diethylene glycol, acetone, formaldehyde, acetaldehyde and acrolein.^[12-14, 21] Experiments with e-cigarettes have found that some of these chemicals may exceed safety standards under certain conditions.^[12-14, 21-23] Potential health effects from these chemicals can range from minor such as irritation to skin, eyes and airways to more severe health impacts.^[22-39] However the direct health effects from exposure to these chemicals from e-cigarettes is less clear and requires further investigation. The USA Food and Drug Administration has found cancer causing chemicals in samples of some electronic cigarettes. Further information is available on the [USA Food and Drug Administration website](#).

Some studies have shown that the aerosols from electronic cigarettes can also contain heavy metal particles such as lead, chromium and nickel which come from parts within the device such as the heating coil.^[40]

People can be exposed to these chemicals both by inhaling the aerosols through the electronic cigarette and by breathing in second-hand

aerosols when they are nearby a person who is using an electronic cigarette.^[13, 14, 41] If someone swallowed e-liquids, they would also be exposed to the chemicals.

Safety of electronic cigarette devices

Electronic cigarettes contain many interchangeable parts, which may affect the performance and safety of the device.^[42] There are no quality controls of their parts, such as batteries and chargers, which are being imported into Australia and used in electronic cigarettes.

Many electronic cigarettes use lithium batteries. These batteries can have a risk of fire and explosion in low quality devices with manufacturing flaws, or if the devices are used or handled improperly.^[42]

There have been anecdotal reports around the world of electronic cigarettes exploding due to battery failures and device malfunctions.^[43] These have resulted in some cases in fires and injury.^[44, 45] It is believed that the main causes of explosion are using incorrect chargers or over-tightening the screw connection to the rechargeable battery.^[46]

Risks of electronic cigarettes for children

Electronic cigarette cartridges and e-liquid capsules can be a danger to children if inhaled or swallowed, as this can result in poisoning or choking.

There is a serious danger of poisoning for children who swallow products which contain nicotine. E-liquid bottles are often not labelled correctly, so even if a bottle says it does not contain nicotine or has no information at all, it may still contain nicotine. The risk of poisoning can increase if e-liquid bottles do not have child resistant packaging.

The risk to children is also increased as e-liquids and electronic cigarettes often contain flavouring (for example bubble gum, chocolate and confectionary) which is likely to be appealing to children.

Product Testing

The Therapeutic Goods Administration (TGA) has not assessed electronic cigarettes for quality, safety or performance, so they should not be considered a safe product. Further information on safety and other issues relating to electronic cigarettes is available on the [TGA website](#).

References used in this fact sheet are available on the [NSW Health website](#).