

## Briefing: Electronic Cigarettes

This briefing provides information about electronic cigarettes. It examines their benefits and risks, use and prevalence in the UK, including as a tobacco quitting aid, and the composition of the market.

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### KEY POINTS

- Electronic cigarettes (e-cigarettes) deliver nicotine in a vapour rather than in smoke
- It has been estimated that e-cigarettes are 95% less harmful than ordinary cigarettes
- There is negligible risk to others from second-hand e-cigarette vapour
- Public understanding of the relative harms of e-cigarettes have worsened over time and are less accurate today than they were in 2014
- Almost all e-cigarette users in Britain are either ex-smokers or current smokers
- There is no evidence that use of e-cigarettes is leading to an increase of smoking in young people in Great Britain
- E-cigarettes are regulated as consumer products under the UK Tobacco and Related Products Regulations 2016

### WHAT ARE E-CIGARETTES?

E-cigarettes, also known as vapes, are battery-powered devices that simulate the sensation of smoking. These devices heat a liquid to generate an aerosol, or a 'vapour', which the user then inhales. The liquids typically contain flavourings, additives and nicotine. E-cigarettes typically consist of a mouthpiece, battery and cartridge or tank containing e-liquid solution. In the first generation of devices, the heating element of e-cigarettes was activated automatically when a user inhaled. However, in most recent generation devices, the user activates heating by pressing a button, to vapourise the liquid, before inhaling. Refillable e-cigarette devices mean that users are able to choose the strength of nicotine in the liquid they use up to the legal limit of 20mg/ml<sup>2</sup>.

None of the e-cigarette products currently on the market in Britain have been licensed as medicines. Instead, they are regulated as consumer products under the UK Tobacco and Related Products Regulations 2016 which transposes the EU Tobacco Products Directive into UK law. In contrast, nicotine replacement therapy (NRT) products, which are used to help smokers quit, are licensed medicines. Nicotine itself is relatively safe, though addictive. NRT products must be rigorously tested for safety in order to get a licence as a medicine from the Medicines and Healthcare products Regulatory Agency (MHRA).

### TYPES OF E-CIGARETTE:

- **'Cig-a-like' products:** The first generation of e-cigarettes were designed to closely resemble tobacco cigarettes. They include non-rechargeable disposable models and reusable models with rechargeable atomisers and replaceable cartridges. The use of 'cig-a-like' products is now relatively uncommon<sup>1</sup>,

- **‘Tank’ models or vape pens:** An e-cigarette with a rechargeable atomiser and a tank which needs to be filled with an e-liquid,
- **Pod systems:** These are compact rechargeable devices, often shaped like a USB stick or a pebble and operating with e-liquid capsules. They are simple to use and to maintain,
- **‘Mods’, or advanced personal vaporisers:** A more complex tank model which can be manually customised, for example by adjusting the power on the device.

## VAPING IS FAR SAFER THAN SMOKING<sup>3</sup>

Using e-cigarettes is considerably less harmful than smoking tobacco cigarettes. The harm from tobacco is overwhelmingly due to its combustion; tobacco smoke contains a large number of toxicants which can be highly damaging to the health of smokers. E-cigarette vapour, in contrast, does not include any combustible by-products, as there is no combustion in the process of heating e-liquids.

The assessment by Public Health England is that vaping is at least 95% less harmful than smoking: *“Vaping poses only a small fraction of the risks of smoking and switching completely from smoking to vaping conveys substantial benefits over continued smoking.”*<sup>4</sup> This is consistent with the findings of the Royal College of Physicians in 2016 that *“the hazard to health arising from long-term vapour inhalation from the e-cigarettes available today is unlikely to exceed 5% of the harm from smoking tobacco”*.<sup>5</sup> The lifetime cancer risk of vaping has been assessed to be under 0.5% of the risk of smoking<sup>6</sup>. In addition, The British Medical Association has stated that *“there is a growing consensus the use of e-cigarettes is significantly less harmful than smoking”*.<sup>7</sup>

The main active ingredient of cigarettes is the psychoactive compound nicotine, which is also present in most e-cigarette e-liquids. Nicotine is an addictive drug which acts as a stimulant on users. However, it is not nicotine which causes harm to cigarette smokers but the by-products of tobacco combustion.

Long-term use of nicotine consumed through nicotine replacement therapy (NRT) has not been found to increase the risk of serious health problems. Regarding pregnancy, while NRT patches had no enduring, significant effect on smoking in pregnancy 2-year-olds born to women who used NRT were more likely to have survived without any developmental impairment<sup>8</sup>. Also, NRT has been found to reduce nicotine exposure in pregnant women compared to smoking<sup>9</sup>.

There are some health risks associated with the other ingredients of e-cigarettes but they are low compared to tobacco cigarettes. In particular:

- Components of e-liquids, propylene glycol and glycerine, can produce toxic aldehydes if they are overheated. However, overheating also creates a bad taste that puts off the user<sup>10</sup>. At normal vaping temperatures, the quantity of aldehydes produced is only a small fraction of the levels inhaled by smokers.
- Flavourings could pose a risk to health but there is currently no strong evidence that any flavourings used by e-cigarette manufacturers present a significant risk to their users.
- Metals have been identified in e-cigarette vapour but at concentrations so low that their risk to health is considered minimal<sup>11</sup>.

While evidence of the relatively low health risks posed by e-cigarettes has grown over time, so has public misunderstanding of these risks. In 2018, a quarter (25%) of adults in Great Britain thought that e-cigarettes were more harmful or as harmful as smoking tobacco, up from 7% in 2013. In 2018, 50% perceived e-cigarettes to be less harmful (33%) or a lot less harmful (17%) than smoking while 23% ‘did not know’<sup>12</sup>.

## THE RISK TO OTHERS FROM VAPOUR IS LOW

E-cigarette users can sometimes generate large clouds of vapour which look like cigarette smoke and can raise concerns about the impact on air quality. Yet, to date, there is no evidence of harm to health from 'second hand vaping' and the risks are likely to be very low. The risk to users of inhaling e-cigarette vapour is low and the risk to those who breathe their exhaled vapour is even lower due to only exhaled aerosol being emitted. The 2018 Public Health England review concluded that the low level of toxins found in e-cigarette aerosol were unlikely to have to lead to any health implications. Further, nicotine levels in second hand vapour were at non-detectable levels compared to secondhand smoke<sup>13</sup>.

ASH and Public Health England have published documents to help organisations develop work place policies regarding the use of e-cigarettes and the effect on other people. For further information see:

ASH briefing: [Will you permit or prohibit electronic cigarette use on your premises?](#)

PHE briefing: [E-cigarettes in public places and work places: a 5 point guide to policy making](#)

## FIRE AND E-LIQUID POISONING RISKS

Fires from e-cigarettes are rare compared to traditional smoking materials.<sup>14</sup> There is a small risk of fire from the electrical elements of e-cigarettes. There have been a few heavily publicised freak accidents where an exploding e-cigarette has maimed or even killed users.<sup>15</sup> In 2016 there were 67 fires in the UK attributed to e-cigarettes, 11 casualties and zero fatalities<sup>16</sup>. This is compared to cigarettes which are the leading cause of fatalities from domestic house fires and causes around 2000 house fires a year.<sup>17</sup>

There is a small risk of poisoning from the ingestion of e-liquids, but these risks are comparable with other nicotine-containing substances such as cigarettes or NRT products. Current regulations help to reduce these risks by specifying child resistant and tamper evident containers.<sup>18</sup> It is recommended that users should not leave e-cigarettes charging unattended or overnight and that e-liquids should be kept out of reach of children.<sup>19</sup>

## E-CIGARETTE USE IN THE UK

The vast majority of e-cigarettes are used by ex-smokers and current smokers. It is estimated that over 3.2 million adults in Great Britain use e-cigarettes – 6.2% of the adult population. Of these users, 52% are ex-smokers, 44% are smokers and 4% are people who report being never smokers<sup>20</sup>. The number of e-cigarette users has grown significantly, up from only 700,000 in 2012. People use e-cigarettes for a variety of reasons, the vast majority for health reasons, to quit smoking or cut down the amount they smoke. Users also report using e-cigarettes to protect others from secondhand smoke, because it gives them pleasure and to save money compared to traditional tobacco. In 2017 e-cigarettes were estimated to be around 50% cheaper than smoking traditional cigarettes over a 3 month period<sup>21</sup>.

E-cigarette users also have diverse attitudes to their use. Some perceive their use of e-cigarettes as a way of managing their nicotine addiction and keeping off cigarettes; others think of it simply as a pleasure which they intend to enjoy in the long term. A third group, who are likely still to smoke, feel ambivalent about their e-cigarette use and do not think of themselves as 'vapers'<sup>22</sup>.

For more information, see the ASH factsheet [Use of e-cigarettes \(vapourisers\) among adults in Great Britain](#).

## E-CIGARETTES HELP SMOKERS TO QUIT

Public Health England has estimated that because of e-cigarettes, there are up to 57,000 additional quitters annually in England, who in the absence of the devices might still be smoking. In 2018, more than half (52%) of the e-cigarette users in Great Britain were ex-smokers – around 1.7 million adults. Among all ex-smokers, nearly one in ten (9.5%) regularly used e-cigarettes.

The use of e-cigarettes by smokers who want to quit smoking increases their chance of success. An analysis of the use of e-cigarettes by smokers in England over ten years (2006 to 2015) found that smokers who used them as part of their attempts to quit smoking were more likely to be successful than those who did not use them<sup>23</sup>. Smokers who try to quit smoking on their own without professional help are around 60% more likely to quit if they use e-cigarettes than if they use nicotine replacement therapy bought over the counter from a pharmacist, or if they try to quit without any nicotine products<sup>24</sup>.

Data from local stop smoking services in England also show the value of using e-cigarettes as well as professional support and licensed stop smoking medicines. In 2017/18, the smokers who achieved the highest quit rate (74%) were those who used e-cigarettes after using licensed medication<sup>25</sup>. In addition, the second highest quit rate (60%) belonged to those who used this combination concurrently<sup>25</sup>.

Most stop smoking services in England now support the use of e-cigarettes by their users. In 2017, 75% of stop smoking services in England supported the use of e-cigarettes and 25% said they ‘neither support nor discourage’ their use. No services actively discouraged the use of e-cigarettes by smokers seeking help<sup>26</sup>.

The most recent guidance for health professionals from the National Institute for Health and Care Excellence (NICE) states the following<sup>27</sup>:

*“For people who smoke and who are using, or are interested in using, a nicotine-containing e-cigarette on general sale to quit smoking, explain that:*

- *Although these products are not licensed medicines, they are regulated by the Tobacco and Related Products Regulations 2016*
- *Many people have found them helpful to quit smoking cigarettes*
- *People using e-cigarettes should stop smoking tobacco completely, because any smoking is harmful*
- *The evidence suggests that e-cigarettes are substantially less harmful to health than smoking but are not risk free*
- *The evidence in this area is still developing, including evidence on the long-term health impact.”*

In addition, the National Centre for Smoking Cessation and Training (NCSCT)<sup>28</sup> has produced professional guidance on the use of e-cigarettes. It recommends that stop smoking services should be open to e-cigarette use in people keen to use them to help them quit. Cancer Research UK and The Royal College of General Practitioners have released a joint position statement supporting the use of e-cigarettes as a means to quitting<sup>27</sup>.

For more information, see the NCST Briefing: [E-Cigarette Briefing 2016](#)

## ARE E-CIGARETTES A GATEWAY TO SMOKING?

To date, there is no strong evidence that e-cigarettes are leading never smokers into cigarette smoking, in the UK. E-cigarettes have proved to be an important gateway out of smoking, not into it.

Youth uptake, the so called “gateway effect”, has often been cited as a concern. However, data from five large surveys of 11-16 year olds in the UK conducted between 2015 and 2017 found that most young people who experiment with e-cigarettes did not become regular users. Furthermore, the prevalence of regular e-cigarette use by young people who had never smoked was negligible (between 0.1% and 0.5%). Overall, there is no evidence that e-cigarettes have driven up smoking prevalence in this age group<sup>29</sup>. In fact, smoking prevalence among young people has declined since e-cigarettes came onto the market.

For more information, see ASH factsheet [\*Use of electronic cigarettes among children in Great Britain, 2018\*](#).

## E-CIGARETTE MARKET

Globally, the market for tobacco products is still far bigger than the market for e-cigarettes. However, as e-cigarettes have become more popular, the tobacco industry has expanded its ownership and control of e-cigarette brands and companies. As the market is still new and fast-moving, it is difficult to gauge exactly how much of the e-cigarette industry is controlled by big-tobacco. Below is a list of some of the major relationships.

- Imperial Brands owns Blu
- PMI (Philip Morris International) owns Nicocigs and Mesh
- BAT (British American Tobacco) owns Vype
- JTI (Japan Tobacco International) owns E-Lites
- Reynolds American owns Vuse
- Altria owns MarkTen and has a part share in Juul

According to the Independent British Vape Trade Association (IBVTA) the e-cigarette and vaping industry is the fastest growing industry in the UK<sup>30</sup>, and after the USA, the UK industry is the second largest globally<sup>31</sup>. Independent ‘Vape shops’ have increased in number and are one of the only retail sectors to see growth on the high street with over half of stores having opened since 2016<sup>31</sup>, suggesting an increasing market for e-cigarette products.

The global e-cigarette market has been forecast to surpass \$43 billion by 2023 due to innovation and a decrease in sales of traditional smoking products<sup>32</sup>. Existing smokers make up 13% of the global population, so the potential market for these products among smokers is huge. The UK market has been forecast to grow by around 30% by 2022<sup>33</sup>.

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