

DEADLY RISK Urgent warning as vapes contaminated with flesh-eating drug found in Britain

Teen vaping becoming an 'epidemic' across UK

Vaping: E-cigarettes have ruined my life, woman says

If you think that your teen vaping is better than them smoking – think again

'Vaping is the crack cocaine of tobacco': Experts say ultra-concentrated hit of nicotine makes devices **WORSE** than smoking - as data shows cigarette use at historic low

Vape tongue symptoms to look out for as e-cigarettes spark fear for new health condition

QUIT IT Any nicotine in pregnancy 'increases risk of sudden infant death', scientists warn

Addressing common myths about vaping

Putting the evidence in context

ash.
action on smoking and health

Expert shares five 'hidden dangers' of vaping – four million Britons at risk

SMOKE SCREEN New alert over **SECONDHAND** vaping as pens spew out toxins 22-times over safe limit

Vaping warning for mums-to-be: Study claims risk of miscarriage is up to 2 TIMES higher for certain flavours

What happens to your body when you vape as doctor warns of risks similar to smoking

Smoking is back in candy-coloured disguise - and a whole new generation is addicted

Lead in vapes may be poisoning our children – it's time we took serious action

Inside Britain's child vaping epidemic: Our horrifying investigation exposes predatory tactics of sweet shops selling e-cigs, vibrant 'dupes' made to resemble Skittles and Jolly Ranchers... and the kids left scarred for life

The child vaping crisis: 'From what my daughter says, 90% of her year do it'

ASH brief addressing common myths about vaping

Putting the evidence in context

Purpose

1. This short brief is to aid responsible reporting of the evidence about vaping and reduce:
 - Repetition of misconceptions as conventional wisdom;
 - Overstating the evidence, with caveats downplayed or missed out;
 - Presenting opinions as facts.
2. The Chief Medical Officer, Professor Sir Chris Whitty, has put the case very succinctly, *"The key points about vaping (e-cigarettes) can be easily summarised. If you smoke, vaping is much safer; if you don't smoke, don't vape."*¹
3. Yet fewer than one in ten smokers understand this, and media coverage often fails to make this clear. In 2023, more than a quarter of adult smokers have never tried vaping to help them quit smoking, although it is one of the most effective quitting aids.²
4. And although representation of vaping in a way which overstates the risk can discourage adult smokers from vaping, it isn't an effective deterrent for adolescents, who are more likely to engage in risky behaviour than adults, and are more susceptible to peer pressure.³ Indeed in 2023 despite more than half all adolescents believing vaping to be more than or equally as harmful as smoking, the highest proportion ever recorded, we also have the highest proportion trying vaping.⁴
5. Adolescent smoking was only successfully reduced⁵ after tough regulations were introduced,⁶ and the policies that worked for youth smoking are equally applicable to youth vaping. That is why ASH strongly supports stricter regulation of e-cigarettes to reduce their affordability, appeal, accessibility and promotion to children, while at the same time ensuring that adult smokers are not discouraged from using vaping to quit smoking.
6. This brief has been peer reviewed by academics and clinicians expert in addiction; behaviour change techniques; electronic cigarettes, smoking cessation and tobacco control; epidemiology; mental health and health inequalities; and respiratory and critical care medicine.
7. For a full list of reviewers see page 8 of this document. Journalists and others reporting on vaping are encouraged to approach the ASH press office (press@ash.org.uk) or the Science Media Centre (<https://www.sciencemediacentre.org/>). ASH can provide advice on how to interpret the evidence and both organisations can put you in touch with relevant topic experts.

Why it is important to represent the evidence accurately

8. Smoking is the leading preventable cause of premature death, responsible for half the difference in life expectancy between the most and least advantaged in society.⁷ Smoking is highly addictive and difficult to quit,⁸ and nearly a million people in the UK have died from smoking since 2010.⁹
9. High quality randomised controlled trials have found nicotine containing e-cigarettes to be an effective aid to quit smoking,¹⁰ Their use has been endorsed by NICE guidance,¹¹ the British Thoracic Society,¹² the Royal College of General Practitioners,¹³ the Royal College of Physicians,¹⁴ the Royal College of Obstetrics and Gynaecology and the Royal College of Midwives,¹⁵ amongst others.^{16 17}
10. There is also real-world evidence from population surveys in England that smokers who use an e-cigarette in a quit attempt are more likely to succeed in that attempt. Changes in the prevalence of e-cigarette use through to 2022 have been associated with increases in the success rate of quit attempts. This suggests that e-cigarettes have helped in the region of 30,000 to 50,000 additional smokers to successfully quit each year in England since 2013.^{18 19}
11. Nevertheless, one in four smokers have never tried vaping, equivalent to 1.8 million smokers, who could potentially benefit from trying vaping to help them quit. Not to mention those who have tried vaping in the past but failed, amounting to another 2.9 million smokers. The provision of accurate information about vaping is vital, as currently 43% of smokers who have not tried vaping, think vaping is as or more harmful than smoking, up from 27% in 2019.²⁰

Common misconceptions about vaping

12. Common misconceptions include the following. See paragraphs listed for the evidence that these are untrue:
 - Vaping nicotine is more harmful than smoking tobacco (paras 21-30)
 - Vaping is more addictive than smoking (paras 31-35)
 - Disposable vapes deliver as much nicotine as 50 cigarettes (paras 36-42)
 - Vaping is a proven gateway into smoking (paras 43-49)
 - Nicotine damages brain development in young people (paras 50-53)
 - The main reason children vape is because they like the flavours (paras 54-56)

Overstating the evidence

13. There are too many of these to cover them all, but here are a couple of recent examples.

DANGER ZONE Vaping while pregnant is NO SAFER than smoking and can leave your baby 'deformed', study suggests (The Sun 7 July 2023)²¹

14. Only in the body of the article is it made clear this is a study of pregnant mice, not humans, and the article fails to acknowledge that mice are not a good model for

human impact.^{22 23} Furthermore, “study suggests” is buried at the end of the headline and should be up front. All that can be concluded from this study is that exposing 9 pregnant mice to the vapour contained in 3 UK standard vapes on a daily basis during pregnancy suggests that that vaping nicotine interferes with fetal bone and lung development in mouse embryos, but this does not prove that this would be true for human embryos.”

15. Much more relevant to human health, a study of 1,140 pregnant women who were smoking in pregnancy found that those who used electronic cigarettes to help them quit smoking had significantly fewer babies with low birthweight compared with those using nicotine patches. Nicotine patches are licensed by the MHRA to help pregnant smokers quit. Furthermore, the trial did not detect any signs of harm to the mother, the fetus or the new-born baby.²⁴

E-cigarettes: Primary school age children are ending up in hospital due to excessive vaping. Figures show there were 15 cases where children aged nine or under needed to be admitted in the year to April. (Sky News 25 June 2023)²⁵

16. This was fifteen admissions due to primary and secondary diagnoses of ‘vaping-related disorder’ which is defined as a respiratory condition thought to result from vaping or use of e-cigarettes.²⁶ Although any hospital admission is undesirable, this compares to 11,051 admissions to hospital among children aged nine or under for asthma in 2021/22.²⁷
17. Furthermore smoking behaviour is not controlled for in the figures for vaping-related disorder (most young people who vape also smoke) nor is it possible to determine whether there was exposure to secondhand smoke. Smoking by parents and carers is estimated to be responsible for around 5,000 children to be admitted to hospital each year, primarily from respiratory conditions.²⁸

Presenting opinions as facts

18. Again there are too many of these to cover them all, but here is a recent example.

'Vaping is the crack cocaine of tobacco': Experts say ultra-concentrated hit of nicotine makes devices WORSE than smoking - as data shows cigarette use at historic low (Mail Online 30 April 2023)²⁹

19. The article ascribes the quote to Dr Andrew Huberman, Associate Professor of Neurobiology at Stanford University, *“who said on his popular podcast that nicotine and cocaine both stimulate a psychoactive rush within minutes. Dr Huberman said: ‘Both crack cocaine and vaping cause very rapid increases in the relative substances that are psychoactive.’”* Huberman is also quoted as concluding that, *‘in the case of vaping there’s a very rapid increase in blood concentrations of nicotine, much faster than occur with cigarette smoking.’*
20. There is no link in the article to any research to underpin these assertions, either by Dr Huberman or anyone else. Indeed, research demonstrates a similar time

course of plasma nicotine uptake with e-cigarettes compared to tobacco cigarettes, although on average levels are somewhat lower from e-cigarette use.³⁰

Common misconceptions about vaping

Vaping nicotine is more harmful than smoking tobacco: NO

21. Over 75,000 people a year die from smoking in the UK, and smoking is still one of the biggest causes of death and disease in the UK.³¹ Passive smoking is the leading modifiable risk factor for poor birth outcomes including miscarriage, stillbirth and sudden infant death syndrome and a significant cause of death and disability in children.³²
22. In the last twelve years five fatalities linked to vaping products (2 cardiac and 3 respiratory) have been reported to the Medicines and Healthcare products Regulatory Agency.³³ In total there were 339 reports covering 942 adverse reactions to vaping. However, the MHRA is careful to point out causation was not proven as healthcare professionals are asked to report even if they only have a suspicion that the e-cigarette may have contributed to the adverse event.³⁴
23. Over 500,000 admissions to hospital a year are caused by smoking, compared with 420 for 'vaping-related disorder'. In other words, there are over 1,000 hospital admissions due to smoking for every one linked to vaping.³¹
24. Furthermore, while a diagnosis of 'vaping-related disorder' shows an association with vaping, causality has not been shown, and smoking behaviour has not been controlled for. Reporting in these cases doesn't currently distinguish between possible harmful effects of legal products and harms from non-licensed products and from the vaping of illicit drugs.
25. In 2023 there are 4.7 million adults currently vaping in Great Britain,³⁵ 93% of whom are ex- or current smokers. Use by never smokers has increased since 2021 but remains relatively rare with 1.1% of never smokers vaping in Apr-Jun 2023, amounting to 320,000 people.³⁶ Around 400,000 children in Great Britain aged 11-17 are current vapers in 2023, of whom around a quarter, amounting to 100,000 have never smoked.³⁷
26. Among children, as among adults, smoking is a cause of much more harm than vaping. Around 5,000 children are admitted to hospital every year because of passive exposure to tobacco smoke,³⁸ compared with 40 admissions among those under 20 in 2022 for 'vaping related disorder'. In other words for every admission linked to vaping among those under 20, there are 125 admissions for children caused by tobacco smoke exposure.
27. The levels of exposure to toxic chemicals from vaping are a tiny proportion of those from smoking.³⁹ Furthermore UK regulations have, since 2016, prohibited the use of any ingredient in nicotine containing e-liquid that poses a risk to human health in heated or unheated form. Prohibited chemicals include vitamins, and diacetyl.⁴⁰

28. Diacetyl has been linked to a rare condition, bronchiolitis obliterans, also known as 'popcorn lung'. It became known as 'popcorn lung' because it was thought to be caused by exposure to diacetyl used as a food flavouring in popcorn factories, although that is disputed.⁴¹ The idea that vaping can cause popcorn lung is frequently repeated,⁴² but although cigarette smokers are exposed to over ten times as much diacetyl as people who vape, smoking has not been shown to cause 'popcorn lung'.⁴³
29. Vitamin E acetate in cannabis vapes was linked to an outbreak of serious respiratory disease in the US called EVALI. Between March 2019 and February 2020 over 2600 cases of EVALI and 60 associated deaths were reported to the US Centers for Disease Control and Prevention. An investigation by the UK medicines regulator found only 2 potential cases in the UK (both fatal),⁴⁴ which met the US case definition of EVALI⁴⁵.
30. There are over 70 years of evidence of the harms of smoking while vaping has only been around for 16 years since 2007, so we cannot yet be precise about the long-term risks of vaping. However, the most recent independent review of the evidence commissioned to inform the government's policies and regulations published in 2022, concluded that vaping poses only a small fraction of the risk of smoking. The review also highlighted that vaping is not risk free and advised against people who have never smoked from taking up vaping.⁴⁶

Vaping is more addictive than smoking: NO

31. How addictive nicotine is depends on product design and the mode of use. Cigarettes carry the highest risk of addiction following initiation, due to cigarette designs that facilitate efficient and tolerable inhalation of nicotine-laden smoke deep into the lung and from there to the brain,⁴⁷ and constituents that reinforce the addictiveness of nicotine.^{48 49}
32. Two thirds of those trying one cigarette will go on to become daily smokers, at least temporarily.⁵⁰ For those who manage to quit, it takes on average 30 attempts before they succeed,⁵¹ and many fail to succeed, with up to two thirds of long-term smokers dying prematurely from smoking-related diseases.⁵²
33. People addicted to nicotine because of smoking who switch to vaping may remain addicted, but they are reducing their risks of relapsing back to smoking which is far more harmful. The same is true for licensed nicotine products (NRT),⁵³ which are licensed by the medicines regulator to help people stop smoking and prevent relapse back to smoking,⁵⁴ the main reasons why ex-smokers vape.
34. One analysis of US surveys of youth use between 2012 and 2019 found that young people who vape but don't smoke are much less likely to be strongly nicotine dependent than those who smoke. There has been no limit on nicotine concentration in e-cigarettes in the US, and the concentration tends to be much higher (5% or 50 mg/ml) than the 2% or 20 mg/ml maximum allowed in the UK.⁵⁵

35. However, it is important to keep monitoring this, as there are some signs that dependency on vaping products might be changing over time.⁵⁶

Disposable vapes deliver as much nicotine as 50 cigarettes: NO

36. The claim that disposable vapes contain, and deliver, as much nicotine as 50 cigarettes has been repeated by, for example, the Times,⁵⁷ the Mail,⁵⁸ the Daily Express,⁵⁹ and Cosmopolitan⁶⁰ sometimes citing sources, sometime not. This claim is not true.

37. The Sun said between 40 and 60 cigarettes,⁶¹ but did at least clarify that it was not implying that this was equivalent in harm to this many cigarettes, as they don't contain many of the harmful toxins to be found in cigarettes, which many articles fail to do.

38. Cigarettes generally contain 10 to 15 mg nicotine per rod, which is 200 to 300 mg per pack of 20 cigarettes.⁶² A UK standard disposable vape with the highest legal level of nicotine (20 mg/ml) contains 2 ml of liquid which amounts to 40 mg of nicotine.

39. On average each cigarette delivers 1.0 to 1.5 mg nicotine into the bloodstream of the smoker, a total of 20 to 30 mg for a packet of 20 cigarettes. Most of the nicotine from cigarette tobacco is delivered into the air as secondhand smoke.⁶³

40. On average about 50% of the nicotine contained in a vape is absorbed by the person vaping. That amounts to 20 mg of nicotine which is at the lower end of the amount of nicotine the average smoker will take in from smoking a pack of 20 cigarettes.⁶⁴

41. Moreover, only 3% of current vapers in the ASH adult survey used nicotine strengths above the legal limit of 20mg/ml of nicotine. The most frequently used strength was 1-3 mg/ml which is equivalent to between 1 and 7 cigarettes. Of the children who have tried vaping, eight out of ten say they use nicotine-containing vapes. Two thirds (64%) most frequently used at the legal limit or below, a quarter (27%) said they didn't know. Fewer than one in ten (8%) used above the legal limit, most of whom used nicotine strengths of less than 30 mg/ml.

42. Furthermore, the amount of nicotine absorbed by an individual depends on how they vape, or smoke, their puffing patterns and how deeply they inhale. Those trying smoking or vaping for the first time, or who are inexperienced, are likely to absorb less nicotine.

Vaping is a proven gateway into smoking: NO

43. If vaping were a gateway into smoking at population level, as vaping increased smoking rates would be expected to show a reduced rate of decline or start to increase. To the contrary between 2010 and 2021 when e-cigarette use grew rapidly from a low base in England, smoking rates among children continued to fall at least as rapidly as previously, which does not support the gateway hypothesis at population level.

44. NHS digital data on current smoking rates among 11-15 year olds in England found that it fell from 9% in 2010 to 6% in 2016 and 3% in 2021.⁶⁵ Among those aged 16+ smoking rates fell from 20% to 18% between 2010 and 2016, and 12% in 2021.⁶⁶
45. Data collected by the UCL Smoking Toolkit Study between 2007 and 2018, showed that the quarterly prevalence of e-cigarette use among the youth (16-24) population in England was not associated with detectable increases or decreases in the quarterly prevalence of smoking uptake.⁶⁷
46. Between 2021 and 2022, the use of disposable e-cigarettes in Great Britain grew rapidly, especially among younger adults, but the overall prevalence of inhaled nicotine use was stable over time, with the increase in vaping likely being offset by a decline in smoking among young adults.⁶⁸ The ASH survey finds a clear upward trend in vaping among 11-17 year olds between 2013, the first year of our youth survey, and 2023, while smoking prevalence continues to be on a downward trend.⁶⁹
47. Moreover survey data shows that children who tried vaping in the US between 2014 and 2017, compared with matched children who did not try vaping, were equally likely to try a cigarette but less likely to progress to regular smoking.⁷⁰
48. However, it is important not to be complacent and to keep monitoring behaviour, particularly among the age of cohorts most associated with smoking initiation. Vaping products are continuing to evolve, and inaccurate perceptions of the risk of vaping are continuing to grow, both of which could change behaviour. Young people in particular are still dealing with the aftereffects of the COVID pandemic, and mental distress in young people has grown in recent years⁷¹ (mental distress is associated with higher smoking rates and greater dependency^{72 73}).
49. Furthermore, it should not be ignored that vaping could be a gateway into smoking for some individuals, although for others vaping could be a gateway out of smoking. Causation is hard to prove as some children who try vaping first may go on to smoke cigarettes, but this association works both ways, and there are common risk factors for both behaviours (e.g., parental smoking, risk-taking and impulsivity); making it hard to prove that vaping caused subsequent smoking.^{74 75} The theory that vaping is a gateway into smoking is supported by some peer reviewed analyses,⁷⁶ but not by others.^{77 78 79 80 81 82}

Nicotine damages brain development in young people: NO

50. Nicotine Replacement Therapy (NRT) is on the WHO list of essential medicines needed to meet the priority healthcare needs of populations, because there is good evidence of efficacy, safety and comparative cost-effectiveness.⁸³ NRT is licensed by the MHRA for smoking cessation, not just by adults but also by young people from age 12 upwards, pregnant women and people with cardiovascular disease.
51. Systematic reviews of the evidence have concluded that evidence is insufficient or unavailable regarding the effects of nicotine and non-nicotine e-cigarette use on development in children and adolescents, and neurological conditions.⁸⁴

52. Furthermore the UK Committee on Toxicity, which was asked to review the evidence of the toxicity of e-cigarettes, concluded that no data were available on direct effects of nicotine exposure in human adolescents, and that while animal studies showed that there was biological plausibility of an impact on development, *"the Committee had reservations about trying to quantify the effects of nicotine in humans from the animal studies as the relationship of the dosing to human exposures is not clear."*⁸⁵
53. Nearly 90% of lifetime smoking in the UK was initiated between 10 and 20 years of age,⁸⁶ and there is, therefore, longer-term evidence concerning the impact on the brain of adolescent smoking. A Scottish study following up a cohort of children born in 1932 who had their IQ tested at age 11, found that at age 70 there was no difference in cognitive function between never and ex-smokers, once IQ had been controlled for, but that there was a small negative association between cognitive function and smoking in old age.⁸⁷ If adolescent smoking doesn't damage cognitive function, it is implausible that adolescent vaping would.

The main reason children vape is because they like the flavours: NO

54. The main reason children give for vaping is 'to give it a try', cited by a quarter (26%) of those who have smoked tobacco and more than a half (54%) of those who have never smoked. The next most common reason is because 'other people use them, so I join in', in other words peer pressure, cited by 21% of ever smokers and 18% of never smokers. Liking the flavours comes third on the list, cited by 16% of ever smokers and 12% of never smokers as their reason for trying vaping.
55. Banning or restricting flavours brings with it the risk of increased cigarette consumption.⁸⁸ In the US where flavour bans and restrictions have been imposed on e-cigarettes, sales data have shown that although there has been a consequent decline in e-cigarette sales, there has also been a significant rise in consumption of cigarettes. The authors noted that 38% of the impact on cigarette sales stemmed from a growth in sales of cigarettes disproportionately consumed by youth.⁸⁹ While increased smoking among adults will almost entirely be due to former smokers relapsing back to smoking, among children it is likely to be a combination of increased initiation and relapse.
56. A decision tool developed by academics at the University of Bristol concluded that, based on the available evidence, a flavour ban would lead to increased smoking. As a result there would be a negative net population impact of a flavour ban, both in the general UK population and low-socioeconomic position UK population, who have higher than average smoking rates.⁹⁰

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