



Vaping: Harm Reduction or Chucking Children under the Bus?

Andrew Bush^{1,2,*}, Jonathan Coutts³, Ross Langley⁴, Kenneth Macleod⁵

¹Department of Paediatric Respiratory Medicine, National Heart and Lung Institute, Imperial College, London, UK

²Paediatric Chest Medicine, Royal Brompton Hospital, London, UK

³Neonatal and Respiratory Paediatric, Royal Hospital for Children, Glasgow, UK

⁴Respiratory & Sleep Medicine, Royal Hospital for Children, Glasgow, UK

⁵Respiratory Paediatric, Royal Hospital for Children and Young People, Edinburgh, UK

*Correspondence: a.bush@imperial.ac.uk (Andrew Bush)

Abstract

Tobacco is one of the great scourges of modern health, and e-cigarettes are suggested to be a means of smoking cessation and harm reduction. This editorial shows that, far from being a source of harm reduction, they are being aggressively marketed to children and young people. The acute effects of e-cigarettes are greater than those of tobacco, and thus we cannot be complacent about the long-term effects. There is accumulating data that e-cigarettes are immunosuppressive, pro-inflammatory and lead to epigenetic effects that are pre-cancerous. There is an urgent need for legislation that is actually enforced to protect children from being the next-generation nicotine addicts.

Key words: acute lung injury; addiction; lung cancer; e-cigarette; nicotine

Submitted: 2 November 2024 Accepted: 19 November 2024

Tobacco Industry

Cigarettes have killed more people than both world wars put together and cause multi-morbidity in many organ systems. The tobacco industry has long pretended to be deeply concerned about reducing harm from cigarettes, deploying dubious measures such as “filter tips” and so-called “low tar” cigarettes. The latest ploy in their unconvincing harm-reduction storyline is the promotion of vaping. Originally sold as aids to quit smoking, or for those who could not quit as a less risky alternative, they have come a long, long way fast, as evidenced by their current marketing. Literally hundreds of different brightly coloured and flavoured vapes are openly displayed in multiple retail premises. Influencers strut their stuff on Tik-Tok and social media, where Food and Drug Administration (FDA)-mandated health warnings are usually conveniently forgotten. Advertisements freely displayed, promotions of professional sports such as football and rugby league—back to the days of cricket’s John Player League and Benson and Hedges Cup. This is the old tobacco playbook recycled again. The most recent innovation in this triumphant march to the money of the vape industry is the disposable vape, allowing access to nicotine addiction at pocket-money prices. The introduction of disposables has been closely associated with an increase in vaping, including by never-smokers ([Jackson et al,](#)

How to cite this article:

Bush A, Coutts J, Langley R, Macleod K. Vaping: Harm Reduction or Chucking Children under the Bus? Br J Hosp Med. 2025.

<https://doi.org/10.12968/hmed.2024.0855>

Copyright: © 2025 The Author(s).

2024). The current result of the tobacco industry’s “harm reduction” is that 25% of 11–15-year-olds have used vapes, and nearly 10% vape regularly (NHS England, 2024). This despite it being illegal to sell vapes to under-18s—enforcement is clearly non-existent. Far from wanting to reduce harm from tobacco, vapes (and especially disposables) make money and recruit customers from a new generation who should never have been exposed to the harms of smoking.

Attitudes to Vaping

How have we allowed ourselves to permit this existential crisis for our children to develop? Sadly, Public Health England (now reinvented as The Office for Health Improvement and Disparities (OHID)) and others have parroted the trope “Vaping is 95% safer than cigarettes”, a statement for which there is no evidence whatsoever (E-cigarettes: Public Health England’s evidence-based confusion, 2015), and which has been roundly rejected by every respiratory and paediatric society across the world outside the UK. The European Respiratory Society in a recent statement has firmly rejected e-cigarette use as harm reduction (Chen et al, 2024). Here we advance the proposition that the acute harm from vaping is far from trivial, and certainly greater than that of tobacco. We do not yet have long-term data on vaping but given that the acute toxicity of vapes is considerable, it is an act of reckless folly to assume that long-term consequences will be insignificant compared to those of tobacco. Because of the permissive approach to vaping by senior health bodies in the UK, many young people who would never have smoked are already addicted to nicotine and will now suffer long-term exposure to toxic vape chemicals.

Safety of Vaping

There are hundreds of different legally purchasable vape liquids, making it impossible to produce any meaningful toxicity data on all these chemicals, alone and in combination, and also on the new array of chemicals generated by heating vape liquids prior to inhalation (Tehrani et al, 2021). The major constituents of vape liquids, propylene glycol and glycerol, are known to be irritants, but there are no high-quality studies on the safety of inhalation of most other chemicals (Toxicology of E-Cigarette Constituents, 2018). How is it possible to be complacent about safety? Would anybody seriously consider accepting a drink in a bar sight unseen from someone with a track record of duplicity? But that is exactly what we are allowing to happen by shutting our eyes while children continue to inhale multiple variations of vape liquids from different devices. The Korean outbreak of interstitial lung disease (Kim et al, 2014), caused by inhaling disinfectant used to clean humidifiers is a clear warning against casually inhaling chemicals.

A particularly egregious example of assuming safety on the flimsiest basis was a recent systematic review suggesting that using nicotine-containing vapes in pregnancy had no adverse effects on the baby. The evidence? Birth weight was unaffected (Calder et al, 2021)! No studies have attempted to detect the well-known adverse effects of nicotine on the growing lung, and no apparent concern was given about the animal studies documenting altered gene expression in the developing

lung, even by inhaling so-called harmless flavourings (Noël et al, 2020). When one considers how careful pregnant women are about exposing their unborn baby to anything, what a triumph for the vape industry to say vaping in pregnancy is safe!

Acute Injury

Serious acute toxicity comes in the form of burn and blast injuries; e-cigarette and vaping acute lung injury (EVALI); and accidental ingestion of the liquids. A report from the US National Electronic Injury Surveillance System survey between 2015–2019 estimated that there were more than 3000 emergency department visits related to e-cigarette explosion/burns injuries. In the same time period, more than 1500 children age under five years were seen because they had drunk one of the liquids (Rossheim et al, 2020). EVALI is an umbrella term for a large number of acute and subacute lung diseases associated with e-cigarette use, some sufficiently serious as to require extracorporeal membrane oxygenation (Landman et al, 2019). Unquestionably many are related to the addition of cannabinoids, but not all are, and it would be foolish to blame contaminants and acquit legal vapes.

Long Term Effects

If the acute toxicity of vapes is higher than that of tobacco, should we not be exceedingly cautious about the long-term effects? We should remember it took Sir Richard Doll decades to convince us that smoking caused lung cancer, and indeed we are still discovering adverse effects of tobacco many years after his death. If a substance is said to be safe, whatever it is, there are two possible explanations; (a) that it truly is safe; and (b) that we have not looked long enough, or hard enough, or in the right places, for evidence of toxicity. Safety can never be proven, only lack of safety. Of course, the more the compound has been used without adverse effects the more one can be reassured, but total assurance is never possible.

Inflammation and Cancer

We do not have long-term studies of vape toxicity, but the scientific studies that have been done do not engender confidence in their safety. Numerous studies have demonstrated that vapes are pro-inflammatory and have adverse effects on the immune system [summarised in (Bhatt et al, 2020)]. Samples of normal lung removed with apical bullae during pneumothorax surgery showed marked changes in gene expression (Kidane et al, 2024). Using buccal scrapes as a surrogate for lower airway tissue, genetic changes likely to lead to gene expression similar to those seen in cancer were detected (Herzog et al, 2024). Using sophisticated computational methods, the effects of tobacco or e-cigarette use on DNA methylation were determined in buccal/saliva, cervical, or blood samples, and epithelial and immune cells were studied at sites which were directly and indirectly exposed. Even in e-cigarette users who had barely smoked there were hypermethylated loci in buccal epithelial cells which in smokers are associated with carcinoma-in-situ and progression to

lung cancer. Importantly, vapes are not watered-down versions of tobacco as the pro-vape lobby would have us believe. As well as toxic effects that overlap with tobacco, they have their own unique adverse consequences (Reidel et al, 2018).

Harm Reduction

All agree that children should not vape, but clearly pious platitudes are no protection against the rapacity of the vape industry. These authors do not have the expertise to comment on the use of vapes as aids to smoking cessation, although many who do are highly sceptical. The main issue is that using vapes as a cessation strategy means relying on commercial products without any consideration of nicotine reduction and how one eventually stops vaping. The role of vapes in cessation appears to be switching one way of satisfying addiction for another.

The banning of disposable vapes can only be a good thing, not least for their adverse environmental effect. We know that legislation works in terms of reducing the harm of tobacco. We also accept that legislation must be carefully thought through to prevent adverse unintended consequences. Scare stories from the vaping industry about a ban creating a “black market” of disposable vapes is a thinly veiled attempt to distract legislators from making meaningful steps to drastically reduce the number of vape devices on our streets. Import of illegal products should be, as it is for tobacco, met with stiff penalties. As a start, e-cigarettes and tobacco could be treated equally in law in terms of advertising and distribution. If there is a need for a supply of vapes to help smokers quit, something for which the evidence seems far from conclusive, then outlets need to be carefully controlled by legislation. Vape shops where anyone can walk in and buy should be closed down. The dreadful consequences of allowing this proliferation of outlets mandate drastic action. What about a nicotine tax, akin to the sugar tax? Without doubt, the vape industry is working hard to anticipate and neutralise future legislation with new devices and loopholes should be closed before anyone can wriggle through them.

Conclusion

Tobacco has clearly been, and is, one of the great scourges of our age, and rightly, all decent and honourable people want to do all in their power to mitigate the effects. But the answer is not substituting one evil for another, nor is it to stand by while children are thrown under the bus in the name of “helping” adult smokers. If there really are any benefits in using vapes for smoking cessation let them be preserved, but we must all come together to protect children from nicotine addiction, and the toxic fellow travellers which are integral to vapes. We must acknowledge that the current situation is a disaster and act before National Health Service (NHS) England has to release even more terrifying figures on vaping in the young.

Key Points

- E-cigarettes are being aggressively targeted at children, and despite legislation, increasing numbers of young children are using them.
- Disposable vapes have been associated with increased uptake of vaping by children and young people, and also never-smokers.
- The acute toxicity of vaping, including burn and blast injuries and many different acute lung diseases, is greater than tobacco.
- The long-term toxicity is unknown, but studies on the effects of genetic and epigenetic changes, and the pro-inflammatory and immunosuppressive effects of vaping are not reassuring.
- Legislation, and enforcement of legislation, is urgently needed to turn the rising tide of nicotine addiction in children and young people.

Availability of Data and Materials

Not applicable.

Author Contributions

AB, JC, RL, and KM conceived this editorial. AB wrote the first draft. JC, RL, KM and AB contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

Acknowledgement

Not applicable.

Funding

AB is an Emeritus National Institute for Health Research (NIHR) Senior Investigator and was also supported by the NIHR through the Imperial Biomedical Research Centre.

Conflict of Interest

The authors declare no conflict of interest.

References

- Bhatt JM, Ramphul M, Bush A. An update on controversies in e-cigarettes. *Paediatric Respiratory Reviews*. 2020; 36: 75–86. <https://doi.org/10.1016/j.prrv.2020.09.003>

- Calder R, Gant E, Bauld L, McNeill A, Robson D, Brose LS. Vaping in Pregnancy: A Systematic Review. *Nicotine & Tobacco Research*. 2021; 23: 1451–1458. <https://doi.org/10.1093/ntr/ntab017>
- Chen DTH, Grigg J, Filippidis FT, Tobacco Control Committee of the European Respiratory Society. European Respiratory Society statement on novel nicotine and tobacco products, their role in tobacco control and “harm reduction”. *The European Respiratory Journal*. 2024; 63: 2301808. <https://doi.org/10.1183/13993003.01808-2023>
- E-cigarettes: Public Health England’s evidence-based confusion. *Lancet*. 2015; 386: 829. [https://doi.org/10.1016/S0140-6736\(15\)00042-2](https://doi.org/10.1016/S0140-6736(15)00042-2)
- Herzog C, Jones A, Evans I, Raut JR, Zikan M, Cibula D, et al. Cigarette Smoking and E-cigarette Use Induce Shared DNA Methylation Changes Linked to Carcinogenesis. *Cancer Research*. 2024; 84: 1898–1914. <https://doi.org/10.1158/0008-5472.CAN-23-2957>
- Jackson SE, Shahab L, Tattan-Birch H, Brown J. Vaping among adults in England who have never regularly smoked: a population-based study, 2016–24. *The Lancet. Public Health*. 2024; 9: e755–e765. [https://doi.org/10.1016/S2468-2667\(24\)00183-X](https://doi.org/10.1016/S2468-2667(24)00183-X)
- Kidane B, Kahn moui S, Srinathan S, Liu R, Tan L, Morris M, et al. Lung transcriptome of e-cigarette users reveals changes related to chronic lung disease. *The European Respiratory Journal*. 2024; 63: 2301623. <https://doi.org/10.1183/13993003.01623-2023>
- Kim KW, Ahn K, Yang HJ, Lee S, Park JD, Kim WK, et al. Humidifier disinfectant-associated children’s interstitial lung disease. *American Journal of Respiratory and Critical Care Medicine*. 2014; 189: 48–56. <https://doi.org/10.1164/rccm.201306-2014>
- Landman ST, Dhaliwal I, Mackenzie CA, Martinu T, Steel A, Bosma KJ. Life-threatening bronchiolitis related to electronic cigarette use in a Canadian youth. *Canadian Medical Association Journal*. 2019; 191: E1321–E1331. <https://doi.org/10.1503/cmaj.191402>
- NHS England. Almost 1 in 10 secondary school pupils currently vape, new NHS survey shows. 2024. Available at: <https://www.england.nhs.uk/2024/10/almost-1-in-10-secondary-school-pupils-currently-vape-new-nhs-survey-shows/> (Accessed: 9 December 2024).
- Noël A, Hansen S, Zaman A, Perveen Z, Pinkston R, Hossain E, et al. In utero exposures to electronic-cigarette aerosols impair the *Wnt* signaling during mouse lung development. *American Journal of Physiology. Lung Cellular and Molecular Physiology*. 2020; 318: L705–L722. <https://doi.org/10.1152/ajplung.00408.2019>
- Reidel B, Radicioni G, Clapp PW, Ford AA, Abdelwahab S, Rebuli ME, et al. E-Cigarette Use Causes a Unique Innate Immune Response in the Lung, Involving Increased Neutrophilic Activation and Altered Mucin Secretion. *American Journal of Respiratory and Critical Care Medicine*. 2018; 197: 492–501. <https://doi.org/10.1164/rccm.201708-1590OC>
- Rosshem ME, McDonald KK, Soule EK, Gimm GW, Livingston MD, Barnett TE, et al. Electronic cigarette explosion/burn and poisoning related emergency department visits, 2018–2019. *The American Journal of Emergency Medicine*. 2020; 38: 2637–2640. <https://doi.org/10.1016/j.ajem.2020.08.017>
- Tehrani MW, Newmeyer MN, Rule AM, Prasse C. Characterizing the Chemical Landscape in Commercial E-Cigarette Liquids and Aerosols by Liquid Chromatography-High-Resolution Mass Spectrometry. *Chemical Research in Toxicology*. 2021; 34: 2216–2226. <https://doi.org/10.1021/acs.chemrestox.1c00253>
- Toxicology of E-Cigarette Constituents. 2018. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK507184/> (Accessed: 9 December 2024).