Australian National University

Community Affairs Legislation Committee - Vaping Reforms Bill 2024 Public Hearing

Question on notice

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QoN Senator CANAVAN: I think that's a very important point that I'd like to come back to, but can I just get an answer to my question. Is there an example?

Prof. Banks: We are not just talking about deaths. There are examples of deaths in those countries from exploding batteries, for example. There are also examples of severe lung injuries. I was just in an international forum recently where a doctor was talking about having a teenager on a ventilator, with tubes in their chest, due to lung trauma related to vaping. They were talking about it being very difficult to remove the tubes because the lung damage is so severe, also noting that they had never had a teenager in their care in that situation because of smoking. So there are examples of severe outcomes. The main thing is we don't have to talk about severe outcomes; you can just talk about the fact that there are large proportions of people getting addicted. It doesn't have to be severe or a death. It can also be that you have, in this case, 30 per cent of current users saying that they would have difficulty quitting, and also to the fact that in Australia—

Senator CANAVAN: That comes back to—sorry.

Prof. Banks: 30 per cent of current users of e-cigarettes have never smoked.

Senator CANAVAN: On notice, could you provide that example of that severe impact? I'm particularly interested to know whether that was a result of the use of illegal regulated vapes, because obviously there's—

Prof. Banks: We actually have a case I can—

Senator CANAVAN: Sorry, I've got very limited time.

Response

Broadly speaking, in the epidemiological context, estimating the excess deaths attributable to a specific exposure generally entails applying the causal component of the absolute difference in risk of death (cause-specific, multiple causes or all-cause) between those exposed and unexposed, in a given population, factoring in the prevalence of that exposure.[1]

These methods underlie estimates that >20,000 deaths per year in Australia are attributable to tobacco smoking.[2] It should be noted that this is a population-level estimate, and individual deaths within the population – including those from conditions known to be made appreciably more probable by smoking, such as lung cancer, chronic

lung disease and coronary heart disease – may not be considered directly caused by smoking, according to coronial or forensic standards. Hence, the "severe impact" of an exposure does not necessarily relate to the ability to attribute individual deaths to it.

Furthermore, as outlined in my response during the hearing, less than fatal impacts of an exposure can also be severe. For example, addiction can severely impact the life of the person affected, especially among children, and is a common adverse effect of vaping.[3,4]

Finally, from a public health point of view, deaths caused by a specific exposure are generally inclusive of patterns of exposure in the population, regardless of legality. For example, road deaths include those involving unregistered vehicles, driving while under the influence of alcohol and speeding, and deaths from alcohol include those occurring in children under the age of 18.

Bearing all of these considerations in mind, it is currently not possible to estimate the likely number of deaths in the population attributable to e-cigarettes, largely due to insufficient evidence regarding their effects on major causes of mortality, including cancer, cardiovascular disease, chronic lung disease, dementia and suicide.

The question of whether there are individual deaths attributable to vaping is probably better directed to those with coronial, forensic, legal and/or related expertise. Based on our reviews and from a brief web search, the following information regarding deaths potentially directly caused by vaping was obtained:

- Our review[5,6] found that:
    - There is conclusive evidence that liquids used in e-cigarettes can cause intentional and unintentional poisoning. Such poisoning can be fatal, particularly in young children.
    - There is conclusive evidence that e-cigarettes can cause e-cigarette or vaping associated lung injury (EVALI).[5,6] This has been largely attributed to vaping tetrahydrocannabinol and/or vitamin E acetate, although around 14% of cases in the largest case series to date, from the US Centers for Disease Control and Prevention (CDC), were reported as attributed to e-cigarettes not delivering these.[7] The CDC has reported 68 deaths related to EVALI ,[8] so some may have been due to legal products. However, it is not possible to ascertain reported individual exposure, or the legality of such exposure, from the available data. Recent evidence from non-US EVALI cases indicates that 76% (13/17 cases) were from reported exposure to nicotine e-cigarettes[9] (ie not from cannabis or other non-nicotine substances).
    - The NASEM review,[10] including only case reports, case series and surveillance reports, concluded that "There is conclusive evidence that e-cigarette devices can explode and cause burns and projectile injuries. Such risk is significantly increased when batteries are of poor quality, stored improperly, or modified by users."
    - There were 68 studies of burns and injuries in relation to e-cigarette use identified: 34 case reports, 27 case series or burn centre reports, and 7 passive surveillance or single burn centre reports.
    - Thermal burns were the most common type of injury and varied in severity.

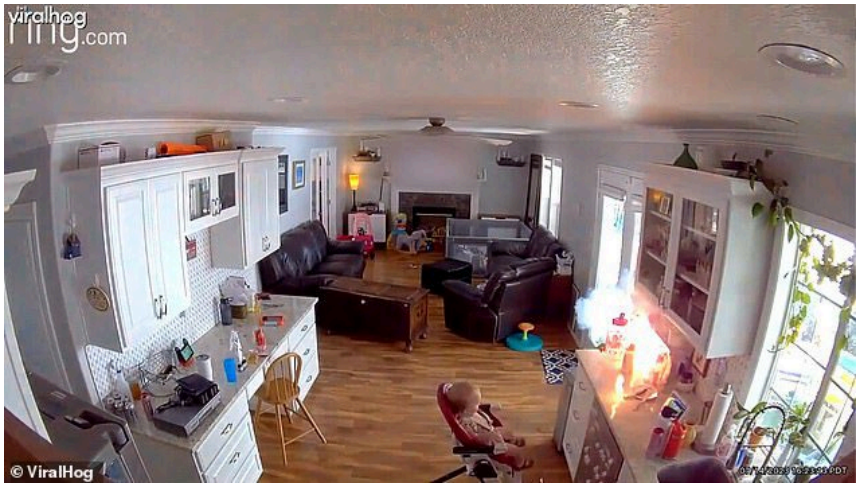
- Burns and injuries tended to occur while the device was being carried or in use, with burns and/or injuries largely affecting the lower limb (often when the device was being carried in the person's pocket, see Figure 1 for example), hands or face (more likely when the device was in use).

Figure 1. Third degree burns reported as being caused by an e-cigarette exploding in the pocket of man in Western Australia.[11]

  - One US death was attributed to an exploding modified e-cigarette device.[12]
  - Burns and injuries from exploding e-cigarettes are uncommon.
- From an online news source, one death in Australia due to lung disease was reported to have been found on autopsy to be most likely to be directly related to vaping,[13] with lung findings meeting three of the criteria for EVALI. The relevant news article states that the vapes used were on prescription and toxicological analyses indicated they did not contain any of the eight substances now banned by the TGA or any obviously toxic molecules.[13]
- A 2017 report from the US Fire Administration reviewed 195 e-cigarette fire and explosion incidents from 2009-2016.[14] Of those where the status of the device at the time of the incident was reported, 64% were either in use or in the person's pocket, 26% were being charged, and 10% were being stored or transported (see Figure 2). The Administration noted:

  > "The combination of an electronic cigarette and a lithium-ion battery is a new and unique hazard. There is no analogy among consumer products to the risk of a severe, acute injury presented by an e-cigarette. Fires or explosions caused by the batteries used in electronic cigarette are uncommon; however the consequences can be devastating and life-altering for the victims. It is likely that the number of incidents and injuries will continue to increase. Since the current generation of lithium-ion batteries is the root cause of these incidents, it is clear that these batteries are not a safe source of energy for these devices."[14]

Figure 2. A reported explosion from a disposable e-cigarette placed on a counter, close to an infant, caught on a home security camera.[15]



- It has been estimated that between 2015 and 2017, over 2000 injuries related to electronic cigarettes presented to US emergency departments,[16] with an estimated average of 835 cases per year in the US, based on 2008-2017 data.[17]
- Two further online news articles were located attributing one death each to e-cigarette explosions.[18,19]

No further documentation regarding deaths reported as relating to e-cigarettes was sought, nor was any technical evidence reviewed or any assessment performed, including on the legality of the devices and e-liquids involved.

References

1. Webb P, Bain C, Paige A. *Essential Epidemiology: An Introduction for Students and Health Professionals*. Cambridge, UK: Cambridge University Press, 2020.
2. Australian Institute of Health and Welfare. Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Institute of Health and Welfare, 2021.
3. Scully M, Bain E, Koh I, Wakefield M, Durkin S. ASSAD 2022/2023: Australian secondary school students' use of tobacco and e-cigarettes. Prepared for Australian Government Department of Health and Aged Care. Cancer Council Victoria, 2023.
4. Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2022-23, Electronic cigarettes and vapes-supplementary tables. Canberra: Australian Government, 2024.
5. Banks E, Yazidjoglou A, Brown S, et al. Electronic cigarettes and health outcomes: umbrella and systematic review of the global evidence. *Med J Aust* 2023;218(6):267-275.
6. Banks E, Yazidjoglou A, Brown S, et al. Electronic cigarettes and health outcomes: systematic review of global evidence. Report for the Australian Department of Health. Canberra: National Centre for Epidemiology and Population Health, 2022.
7. Krishnasamy VP, Hallowell BD, Ko JY, et al. Update: characteristics of a nationwide outbreak of e-cigarette, or vaping, product use-associated lung injury - United States, August 2019-January 2020. *MMWR Morb Mortal Wkly Rep* 2020;69(3):90-94.
8. Centers for Disease Control and Prevention. Outbreak of lung injury associated with the use of e-cigarette, or vaping, products.

9. Sund LJ, Dargan PI, Archer JRH, Wood DM. E-cigarette or vaping-associated lung injury (EVALI): a review of international case reports from outside the United States of America. *Clin Toxicol (Phila)* 2023;61(2):91-97.

10. National Academies of Sciences, Engineering, and Medicine. Public health consequences of e-cigarettes. Washington, DC: National Academies Press, 2018.

11. Johns R, Luff B. Perth man suffers third-degree burns as vape explodes in pocket. https://7news.com.au/news/public-health/perth-man-suffers-third-degree-burns-as-vape-explodes-in-pocket-c-10732657 Accessed May, 2024.

12. Beining T, Thogmartin JR, Kurz W. Projectile wound to head from modified electronic cigarette explosion. *J Forensic Sci* 2020;65(4):1365-1367.

13. Atkin M. Autopsy finds man most likely died as a result of vaping. https://www.abc.net.au/news/2022-02-21/autopsy-finds-man-most-likely-died-as-a-result-of-vaping/100800004 Accessed May, 2024.

14. U.S. Fire Administration. Electronic cigarette fires and explosions in the United States 2009 - 2016. 2017.

15. Times Now World. China made Elf Bar vape blasts while charging near baby in US video. https://www.timesnownews.com/world/china-made-elf-bar-vape-blasts-while-charging-near-baby-in-us-video-article-108360188 Accessed May, 2024.

16. Rossheim ME, Livingston MD, Soule EK, Zeraye HA, Thombs DL. Electronic cigarette explosion and burn injuries, US Emergency Departments 2015-2017. *Tob Control* 2019;28(4):472-474.

17. Dohnalek HM, Harley EH. Analysis of electronic cigarette-related injury presenting to U.S. emergency departments, 2008-2017. *J Emerg Med* 2019;57(3):399-404.

18. BBC. Man killed as e-cigarette 'explodes', Merseyside fire service says. https://www.bbc.com/news/uk-england-merseyside-28701515 Accessed May, 2024.

19. Williams D. A man dies after his e-cigarette explodes in his face. https://edition.cnn.com/2019/02/05/health/exploding-vape-pen-death-trnd/index.html Accessed May, 2024.