

The need to regulate electronic cigarettes amidst health concerns: Let's follow the evidence

Growing evidence, including 60 confirmed deaths and >2 000 electronic cigarette-related acute lung injuries reported in the USA,^[1] has prompted the banning or restriction of e-cigarette sales in some US states^[2] and in >98 countries to protect the health of citizens.^[3] South Africa (SA) is yet to follow suit. To evaluate the need for urgent regulation of e-cigarette use in SA, considerations of key arguments are reviewed below.

The case against e-cigarettes

E-cigarettes are not harmless

In 2016, the European Public Health Association stated that 'The health risks associated with e-cigarettes remain uncertain, but they cannot be considered safe. What is certain is that statements that they are some percentage safer than cigarettes are so far unjustified.'^[4]

Some of the harmful substances found in e-liquids and aerosols include propylene glycol (among the main base ingredients or solvent carriers of e-liquids^[5]), carcinogenic tobacco-specific nitrosamines, formaldehyde, heavy metals such as nickel and tin, as well as nicotine, a known addictive and harmful drug.^[6,7] A growing body of evidence confirms that e-cigarette use is linked to severe health conditions, including cancers, respiratory and cardiovascular diseases, chest pains, mouth ulcers, asthma, and a high risk of stroke.^[7-10] For smokers wishing to stop smoking, e-cigarettes have been noted to carry 10 times the carcinogenic risk of a nicotine inhaler.^[11]

A publication in *Scientific Reports* concluded that e-cigarette vapours exhibited co-mutagenic and cancer-initiating effects in laboratory experiments with rats, prompting the authors to caution that 'the erroneous belief that e-cigs are safe should be retracted and suitable measures implemented to protect public health.'^[12] Unsurprisingly, the International Agency for Research on Cancer has made it an urgent priority to investigate the carcinogenicity of nicotine and establish a monograph assessment of its cancer potential.^[13]

A systematic review of 82 e-cigarette studies revealed that, although a number of known toxicants are present at lower concentrations in vaping fumes than in tobacco smoke, the same cannot be said about particulate matter, as e-cigarettes deliver amounts and sizes similar to those in traditional cigarettes.^[5] The same authors caution that 'e-cigarette aerosol also contained other metals, including nickel (a carcinogen), at levels 2 to 100 times higher than found in Marlboro cigarette smoke.'^[5] At a high level and with prolonged exposure, nickel is known to be carcinogenic and affects lung function, as well as causing other diseases.^[14]

A 2019 study on mice showed that the chronic use of e-cigarettes, with or without nicotine, damages the defence system of the lung, increasing lung susceptibility to virus and pathogens.^[10] An additional hazard unique to e-cigarettes is the risk of explosion while being charged, used or even stored,^[15,16] which has never been reported with traditional cigarettes. This has led to strict regulations that require these products to be carried in checked-in luggage only during air travel.^[17]

E-cigarettes can be harmful to passive vapers

A study investigating the quality of air in a well-ventilated room where e-cigarettes were smoked concluded that 'e-cigarettes are not emission-free and their pollutants could be of health concern for

users and second-hand smokers.'^[18] It should be noted that research already draws the attention of public health to third-hand exposure to nicotine from e-cigarette aerosol.^[19] Third-hand exposure includes exposure to particles or substances from e-cigarette aerosol that get stuck to the furniture, wall paint and surfaces of items in an environment where e-cigarettes were used.^[19] These toxicants can subsequently be mobilised and inhaled by persons who were not present when the e-cigarette was used.

E-cigarettes can act as a gateway to smoking tobacco

In addition to an up to threefold increase in the use of e-cigarettes among young people, increasing numbers of people in Poland and the USA who have never smoked are reporting using e-cigarettes.^[20,21] The US Surgeon General's report on youth e-cigarette use highlighted the strong association between e-cigarettes and other tobacco products.^[22] E-cigarettes can increase the risk of nicotine addiction among young people, which may lead to the use of other tobacco products, including traditional cigarettes.^[20] While some have argued that the 'key to the public health impact of vaping will be the willingness of more smokers to switch the way they use nicotine rather than to quit completely',^[23] it is also the case that e-cigarette use risks the creation of a new generation of nicotine addicts and presages a reversal of decades of progress in tobacco control.^[24]

The conflicting evidence landscape

Caution is needed, given the potential and real risk of using e-cigarettes. It should be expected that the potential good a new drug might achieve in the treatment of a disease should not be exceeded by the harms it may cause. This is why clinical trials and drug testing are conducted before new drugs are rolled out onto the market – they must be certified to be a solution rather than a contributor to the medical problem they seek to solve. Unfortunately, e-cigarettes were not put to the same test of overall population health benefit before being introduced to the market. They have been promoted with marketing propaganda rather than with scientific evidence of any population-level benefit resulting from their use. Therefore, most scientists have been compelled to play 'catch up' with regard to ensuring that this product does not begin yet another phase of the tobacco epidemic.^[25]

The report by Public Health England (PHE),^[26] on which the credibility of the claims about e-cigarettes has been hinged, is based on a study^[27] reliant on the perceptions of 12 'experts': it did not consider evidence from research or clinical data; it did not conduct any form of risk assessment consistent with scientific methods; it relied on reports it commissioned that were not subject to peer review; some of the authors did not declare their conflicts of interest; and it was produced at a single consultative meeting partly sponsored by companies with links to the vaping industry.^[24,28] Also, PHE is not a body responsible for directing public health globally.

The World Health Organization (WHO) has called for the regulation of e-cigarettes to focus on four aspects: discourage the promotion of e-cigarettes to non-smokers and young people; reduce the potential health risks to e-cigarette users and non-users; prohibit the promotion of unproven health claims regarding e-cigarettes; and prevent the tobacco industry from becoming involved in the marketing and promotion of e-cigarettes.^[29]

We do not disagree that e-cigarettes may have been helpful to some individual smokers to quit. We also do not have access to all details on how some smokers succeeded in using e-cigarettes to quit, and if they used this product in addition to counselling or other evidence-based smoking cessation tools. However, people should be aware that population assessment of e-cigarettes as a quit-smoking aid has shown that it reduces the likelihood of quitting for many people. We also do not contend with the fact that, given the limited information currently available to public health, e-cigarettes may be perceived to be less harmful in some respects than traditional cigarettes. We do not support the promotion of e-cigarettes as a population-level solution with 'less harm', as e-cigarettes have been found to be harmful. Furthermore, other, less harmful, options for quitting have incoherently been disregarded.

The tobacco industry has a stake in the e-cigarette industry

We believe that it should be of concern to any individual who cares about public health that the tobacco industry, which has consistently lied about their products,^[30,31] are now the major stakeholders in the e-cigarette industry.^[32] All but one of the top five e-cigarette companies globally are tobacco companies and are producing and marketing e-cigarettes alongside cigarettes.^[32] These are Altria (formerly Philip Morris companies), British American Tobacco, Imperial Brands, Japan Tobacco International, and NJOY (NJOY is the only company among these not known to be a tobacco manufacturing and marketing company). Knowing the industry, we need to continue with vigilance and caution.

Conclusions

The growing evidence raises concerns, revealing harmful effects from short-term e-cigarette use. The long-term health effects are largely unknown at this stage, but current evidence points to the need for caution with regard to e-cigarettes. We call on the SA government to take swift action to avoid the public health risks of e-cigarettes and speedily pass the Control of Tobacco Products and Electronic Delivery Systems Draft Bill^[33] into law, which will provide for the regulation of e-cigarettes as for other tobacco products.

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