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COMMENT

The public health impact of e-cigarette use: Revisiting Geoffrey Rose's prevention strategies

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E-cigarettes are mass-marketed consumer products promoted by the industry as harmless devices and smoking cessation aids. Whether e-cigarettes help smokers to quit or undermine public health remains splitting the public and the health community. Although some countries and healthcare providers (HCPs) recommend e-cigarettes for smoking cessation, no e-cigarette medical device has ever been approved and launched in the market.[1]

Thirty-eight years ago, Rose described two main primary prevention strategies.[2] The high-risk individual approach aims to identify the most susceptible individuals and offer medical treatment to eliminate or reduce disease risk factors. The population-based strategy seeks to control disease determinants in the whole population.[2] Public health policies can achieve a population-wide impact, reducing population-risk and lowering disease incidence. Motivating and supporting smokers to quit in clinical practice is a high-risk strategy. While embracing the moral/ethics of clinical practice, this strategy usually reaches a population minority limiting its public health impact.[2] The high-risk strategy is adequate to target those who seek medical care, mostly dependent smokers with co-morbidities. However, targeting young yet disease-free smokers, mainly primary-care users, obtains further health gains, saving lives and downscaling smoking-associated mortality and disability.

Importantly, implementing comprehensive tobacco control can change social norms, prevent tobacco uptake by youth, promote smoking cessation at a population-level and prevent smoking relapse.[3] The population strategy while controlling population-risk and reducing smoking prevalence

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achieves broad-ranging primary prevention but fails to help heavy/reluctant smokers needing intensive treatment.

Prevention is a continuum: both strategies are useful and potentially synergistic.[2] Implementing broad-reach cessation interventions together with comprehensive tobacco control maximises population impact, reducing health inequalities.[3]

While most smokers contemplate quitting, they are often ambivalent, and need support and treatment.[4] Supporting respiratory patients who smoke to quit is the most cost-effective intervention to improve patients' health and quality of life. Systematically identifying smokers and advising them to quit can increase motivation and foster quit attempts, even among reluctant smokers.[4] Smoking-cessation brief advice given to all smokers does not result in the highest quit rates but has the greatest impact, as many try to quit. This should be standard care. Additionally, smokers assisted with evidence-based counselling and pharmacotherapy can achieve higher quit rates.[4] The unacceptable paradox is that brief advice remains neglected in healthcare. While HCPs lack smoking cessation training, few health systems offer smoking cessation best practice.[3] A recent survey evaluated smoking cessation support among 8000 European smokers.[5] Among smokers reporting a health visit, less than half received any kind of advice or support to quit. Those suffering from respiratory diseases, multiple comorbidities or older than 55 were more likely to receive advice; less than one in five smokers had attempted to quit in the previous year. Support to quit was scarce and inconsistent. Furthermore, clinicians failed to advise younger smokers, undermining early cessation and primary prevention.[5]

Eurobarometer surveys reveal a downward trend of healthcare-assisted quitting towards unassisted quitting or e-cigarette use.[6] Moreover, population-based surveys suggest that e-cigarettes used as consumer products do not promote smoking cessation and may promote relapse in ex-smokers.[1,7-10]

Furthermore, while e-cigarettes in clinical trials may help some smokers to stop smoking, 50 to 80% persist using them by the end of the trial[1], undermining long-term nicotine abstinence.[11]

While smoking-cessation best practice is disregarded by HCPs and health systems; the industry is mass-marketing e-cigarettes as harm reduction tools with governments' complacency; undermining evidence-based assisted smoking cessation and smoke-free policies, and re-normalizing smoking.[1]

We should also consider that e-cigarettes use the inhaled route to administer nicotine, a powerful pathway for addiction and systemic toxicity; dual use is common[1] and potentially more harmful.[12] Therefore, these products do not help smokers to overcome nicotine addiction, postpone quitting in current smokers, hook new consumers through experimentation, and maintain or aggravate health risks.[1,11,12]

According to Rose, large numbers of people at small risk cause more disease burden than the small number who are at high-risk. This epidemiologic scenario is common, limiting the population impact of a high-risk strategy.[2] This explains why encouraging smokers to switch to potentially less harmful products, instead of quitting, and promoting e-cigarette use among youths, who otherwise would not have uptake cigarettes, has the potential to foster population-wide nicotine use and a heavy disease burden. Even if e-cigarette use may lower individual health risk in comparison to combustible cigarettes (an unresolved assumption: e-cigarette aerosol may deliver lower levels of toxicants, but the evidence on long-term hazards is lacking); promoting nicotine use at a population-level may result in a public health tragedy. The higher prevalence of inhaled-nicotine users may increase population risk-factors, raising the incidence and burden of chronic diseases. This is supported by simulation models that quantified the balance of population-health benefits and harms associated with e-cigarettes.[13] While built on the current evidence and the highly optimistic supposition of 95% relative harm reduction of e-cigarette use compared to smoking, the study concludes on a net population-level harm.[13] Lastly, e-cigarette use is increasing globally, especially among youths, threatening the current worldwide downward trend of combustible cigarettes.[1,14,15]

Taken together, Rose's vision of population-health, and the current evidence on e-cigarettes (potential health harms and addiction risk of persistent use, and alarming youth use), support that the English Health Minister decision to launch the "swap to stop" campaign distributing free e-cigarette kits to one million smokers[16]; is neither a proven nor a safe public health strategy to reduce smoking-associated mortality and disease burden.

According to the English Minister, "vaping" would be a "powerful tool" to help people quit smoking and, together with initiatives to prevent youth uptake of smoking, would contribute to reducing smoking by 5% in England by 2030.[16] However, this strategy does neither follow evidence-based medicine good practice nor medical ethics "*primum non nocere*" i.e. "first do not harm". The evidence on the potential health effects of e-cigarette use is expanding. While their long-term health effects are yet uncertain, the precautionary principle demands tacit public health action. E-cigarettes are neither medical devices nor medicines, but consumer products banned in more than 40 countries. They have been claimed by manufacturers as safer products emitting less and lower concentrations/amounts of known carcinogens and other toxicants, leading to reduced exposure and health risks. However, the somewhat lower concentrations of some substances do not necessarily translate into proportionate reductions in health risks.[17] Their aerossol provides, in addition to inhaled nicotine, particulate matter, inhaled carcinogens and many other toxic and irritating substances to the respiratory, cardiovascular and immune systems.[1] These devices also offer specific hazards, such as the inhalation of heavy metals leaking through the heated filament, an acute lung injury syndrome (EVALI), and device explosion.[1] While the health effects of second-hand e-cigarette aerosol (SHA) are less studied, SHA emissions of toxicants and particulate matter seem to be significantly lower than those from second-hand tobacco smoke, with the exception of some metals (Ag, Ni, and ZN).[18] This reduction may, however, not consistently reduce or eliminate health hazards for vulnerable populations such as chronic respiratory or cardiovascular patients, children, pregnant women, or non e-cigarette users exposed to it. Furthermore, lifetime environmental exposure is cumulative and all preventable harmful exposures should be avoided.

Following the World Health Organisation and the European Respiratory Society recommendations, we urge for strong tobacco control and prevention of nicotine use among youth by effectively regulating novel products or banning their sales. Ethics underpin clinical and public health practice; it is our duty to encourage and support tobacco/nicotine users to become nicotine-free. We must not embrace the “pharmaceuticalization of the tobacco industry”[19] promoting e-cigarettes as safer alternatives to smoking or smoking cessation aids instead of offering evidence-based treatment and pharmacotherapy. We must not neglect our main job: advocate for comprehensive tobacco control; take everyday opportunities to ask our patients about tobacco and nicotine use and support them to quit and breathe clean air for life.

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Ethical disclosures

The authors declare that they have written the manuscript respecting ethical in clinical practice.

Conflicts of interest

None.

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