ADDICTION
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COMMENTARY

A gateway to more productive research on e-cigarettes? Commentary on a comprehensive framework for evaluating public health impact

The widespread use of the comprehensive framework proposed by Levy and colleagues for evaluating the overall public health impact of e-cigarettes would advance the field. Time–series analysis of frequent cross-sectional population data on smoking and quitting activities could be invaluable in estimating key parameters for such models.

E-cigarettes are controversial among tobacco control and public health experts [1–3]. Part of the reason is that opponents and proponents focus upon different parts of the complicated equation that will determine their overall impact on public health, and there have been few attempts to quantify and integrate all the determinants into an overarching population model [4,5]. Levy and colleagues describe a novel and ambitious framework for evaluating the public health impact of e-cigarettes [6]. A particular attraction is that their framework appears comprehensive and necessarily complex. The authors draw upon systems thinking and decision theory to cover all possible transitions among never, current and former smokers to a variety of final states of nicotine use. In each case, they argue that the overall impact will depend upon how e-cigarette use influences the long-term prevalence of each final state compared with the counterfactual situation in which e-cigarettes do not exist.

This type of framework helpfully draws attention to the possibility of certain scenarios in which e-cigarettes reduce overall harm, despite the assumption of many opponents that they will increase harm: for example, e-cigarettes could actually reduce harm to never smokers who would have otherwise initiated long-term cigarette use. It would be a huge advance if this paper moved the field towards consensus on the key parameters necessary to produce judgements on the overall population impact of e-cigarettes. Adoption of a common framework and language would make the field more productive, even if researchers continued to disagree on how to interpret different studies when parameterizing and weighting different parts of the model. The positive impact of a 'Russell Standard' for evaluating clinical interventions is testament to the importance of common language in the field [7].

Levy and colleagues employ the novel framework to structure a balanced and progressive review of literature that could be used to parameterise the model [6]. Greater benefit will arise when using the model to simulate appraisals of overall impact under a variety of different estimates and assumptions. In terms of literature and methods for parameterizing the model, the paper cites trials and cross-sectional surveys, and notes that interpretation of the latter can be enhanced by matching methods, which have been used to address a variety of thorny issues in tobacco control [8–10]. Finally, their conclusion emphasizes the importance of large-scale longitudinal studies, such as the US Population Assessment of Tobacco and Health (PATH) survey and the International Tobacco Control (ITC) surveys. The ITC will be particularly important beyond its contribution of longitudinal data by also providing a means of evaluating natural experiments arising from different countries adopting different regulatory approaches [11,12].

An additional type of data—not explicitly mentioned in their commentary—is likely to prove valuable in this context; namely, frequent cross-sectional time–series population data on important smoking and quitting activities. Time–series analysis of these population trends would provide direct estimates of both population level associations between variables over time and the associated impact of new policies and regulations, while adjusting for important confounders and seasonal and long-term trends [13]. Associations cannot establish a causal association unequivocally but they can be indicative as, for example, in estimates of the relationships between price and cigarette consumption [14], mass media expenditure and the use of freely available behavioural support [15], changes to national incentives for general practitioners to offer evidence-based advice and referral behaviour [16] and the introduction of varenicline and use of other cessation medication [17]. In a more relevant recent example, we have argued that the growth in the use of e-cigarettes by English smokers was probably not responsible for the decline in the use of licensed nicotine products [18]. In this example, our time–series evidence could be a factor in estimating the counterfactual pathway of current smokers in Levy and colleagues' framework because the number of smokers who would have quit in the absence of e-cigarettes is not due only to their relative efficacy in cessation, but also whether and how their availability effects other quitting activity.

Importantly, Levy and colleagues acknowledge that critical information for populating the framework will need to be updated continually, and likely only directly applicable to contexts from which that information is derived. Many of the estimated transitions are liable to depend upon a variety of cultural and contextual factors, including the prevailing tobacco control environments.

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Tobacco harm reduction from clean nicotine delivery is at least 40 years old [19]. The idea is beautifully simple, but this paper by Levy and colleagues underscores the complexity in evaluating the impact of related products. While the current focus is on e-cigarettes, other novel devices—such as heat-not-burn tobacco products—loom that will complicate the modelling [20]. In order to minimize the growing number of global avoidable deaths from tobacco, scientists should rely upon clear and common frameworks with explicit parameterization when considering the range of possible public health effects.

Declaration of interests

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