Component	Description
Title	Cleaning up the science: the need for an ontology of consensus scientific terms in e-cigarette research
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Statement of competing interest	Sharon Cox is a Senior Editor at Addiction Journal. She has also provided expert consultancy to providers of UK life insurance and the pharmaceutical industry on matters on relating smoking cessation. She receives salary support from Cancer Research UK (C1417/A22962). Caitlin Notley is an Associate Editor for Addiction.
Key words	EVALI; vaping; vape; e-cigarettes; ontology; terminology
Concise statement	The public health response to EVALI has highlighted the widespread misunderstanding of vaping products. We urgently need to clean up the science of e-cigarette and other electronic vaping products to avoid regulatory actions based on erroneous beliefs.

| Commentary | Hall et al.,(1) provide a detailed account the US public health response to the EVALI (e-cigarette or vaping associated lung injury) cases, including how a spurious association with the concurrent increases in youth e-cigarette use in the US meant e-cigarettes were considered the primary cause of the injuries. Although the US Centre for Disease Control (CDC: (2)) has correctly identified illicit THC vaping as the cause of the injury, research reports are still being published which implicate e-cigarettes. Given the widespread prevalence of nicotine vaping with e-cigarettes and the geographically focused outbreak of the injuries, it is surprising that so many researchers published reports making such claims. This is either deliberate obfuscation or genuine misunderstanding of the products. Either way, it has become clear since the reporting of EVALI incidents, that while e-cigarettes are well-researched as a broad category, they are not well-understood products. This is a point that Hall et al., do not offer in-depth explanation for. We offer some perspective and solution in this commentary.

There are many products and devices for 'vaping', i.e., inhaling a heated vaporised substance. Heated tobacco products, cannabis and THC vapourisers, waterpipes, and hookahs are all 'vaping devices', but are not always correctly classified nor delineated by researchers and policy makers in the published literature or within public statements. Instead, many products are broadly referred to as 'vapes' or electronic vaping devices or misclassified as e-cigarettes. Some of these products contain nicotine, some do not. Some contain tobacco, but most do not. None involve combustion. Use of these products represents a continuum of harm to health. Importantly, each type of device is designed to vapourise a specific substance. As a result, typical e-cigarettes cannot easily or satisfactorily vapourise non-e-liquid substances as, on the most standard and most popular devices, the coils are too delicate. Though there is counterculture of users who report trying this (3), most e-cigarettes are used for tobacco smoking cessation (4). Even amongst adults presenting with substance use disorders, trying to use an e-cigarette to vape other psychoactive substances is not widespread (5), perhaps primarily because this is an inefficient and unsatisfying way to consume other substances.

Ontologies are used across the sciences and present a shared knowledge database of what is known in an area of research (6). Within ontologies, entities (e.g., products, behaviours, processes) are represented in position with the entities to which they are most |

closely related. An e-cigarette ontology (E-CigO) is being developed and will provide scientific consensus on a coherent and systematic way of defining relevant entities, enabling clear indexing of research methods and findings in the field (7). It will enable more accurate, complete and detailed searching of relevant literature than is currently possible and provide a basis for evidence integration and interpretation. Of particular relevance for the case example here, E-CigO provides *explicit definition of terms* used within the field and their *relationships* to each other. Users will be able to query the ontology as a searchable system and filter an index of definitions. Users will also be able to identify how entities are being applied by e-cigarette researchers and policy makers across different disciplines, including where divergence exists. Importantly, in the case of the EVALI reporting, each entity is clearly defined in a way that transcends territories. For example, an e-cigarette is defined as 'an electronic vaping device that is hand-held and produces for inhalation an aerosol formed by heating an e-liquid'. The importance here is the definition is based on what the product does, not what it is believed to be or do or how it is regulated. Other types of electronic vaping devices are included in the ontology, including cannabis vapourisers, and they differ based on key device characteristics. Device components are also included and relate specifically to their parent product.

While not everyone will engage with the ontology, it is hoped for those who do, it provides a useful point of reference and at least a starting point for greater clarity than the current status quo. This is important because smoking continues to be one the leading causes of preventable death and disease and disproportionally affects those from poorer communities (8,9). A better foundational knowledge of the range of non-combustible nicotine products that can be used to help reduce the burden of tobacco smoking is needed. Sound, scientific consensus of key terms and product types is a must to avoid the regulatory overreactions Hall et al. highlight. This would enable e-cigarettes and other non-combustible products to be available as a harm reduction option for the smokers who could most benefit from their availability.

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