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Outbreak of pulmonary diseases linked to vaping

An important reminder that vaping is not a harmless activity

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Over the past two months, vaping has been associated with more than 450 cases of severe pulmonary disease in the United States. Cases have been detected in 30 US states, including several deaths.[1] Primary clinical features include respiratory symptoms such as cough, shortness of breath, or chest pain. Some cases also include gastrointestinal symptoms (nausea, vomiting, or diarrhoea), as well as non-specific constitutional symptoms (fatigue, fever, or weight loss). All cases reported using e-cigarettes before the onset of symptoms.

The outbreak has caused alarm among public health authorities, and renewed questions about the safety of vaping. To date, much of the literature on the health effects of vaping has focused on the relative risk compared with smoking.[2] There is now strong consensus that vaping is substantially less harmful than smoking, and smokers who switch exclusively to vaping have the potential to lower their health risks.[2-4] There is, however, less consensus regarding the absolute risks of vaping among non-smokers. Most e-cigarettes emit numerous potentially toxic substances, although the extent to which long term exposure to these substances increases disease risk remains unknown.[5] As was the case for cigarette smoking, it will likely require 10 to 20 years before sufficient epidemiological data emerge, given the time lag between onset of regular use and the onset of chronic disease.[6]

The circumstances of the outbreak suggest that recent cases of pulmonary disease are likely a result of either faulty devices or contaminants in the substances being vaped, rather than the general effects of vaping. Firstly, although vaping has been prevalent for most of the past decade, this is the first time it has been associated with an outbreak of pulmonary disease. Secondly, the outbreak appears to be confined to the US, with no evidence of similar cases in other countries with a comparable prevalence of vaping, such as Canada and the UK. If acute pulmonary disease was a common adverse effect of vaping, we would expect cases to be distributed more widely, over time and across other jurisdictions.

One of the challenges in assessing the outbreak is the lack of clarity regarding the types of vaping products used by affected patients. The US Centers for Disease Control and Prevention has noted that, "no single substance or e-cigarette product has been consistently associated with illness."[1] This lack of clarity underscores the extraordinary range of vaping devices on the market, from mainstream e-cigarette products manufactured by large multinational companies, such as JUUL, to products manufactured by small companies, many of which are modified by users to alter performance.[7 8]

Toxic exposure from e-cigarette products can be highly variable depending on characteristics of the device, the liquid solution, and how the device is operated by the user.[5] In addition, many of the patients reported pulmonary symptoms after vaping tetrahydrocannabinol (THC) or cannabis oils, rather than nicotine e-liquids. THC vape oils are widely available in both legal and illegal cannabis markets in the form of vape pens, as well as cartridges and liquids that can be used in e-cigarette devices.[9-11] Recent reports suggest that laboratory tests on products used by several patients have identified the presence of vitamin E acetate, an oil derived from vitamin E.[12] Although vitamin E acetate is commonly used in nutritional supplements and topical skin creams, it could be hazardous when inhaled. The extent to which vitamin E oil accounts for outbreaks of pulmonary disease across the 25 states remains unclear; however, these preliminary findings highlight potential differences in the toxicity of substances when inhaled into the lungs compared with other routes of administration, such as oral ingestion.[5 6]

Overall, the outbreak highlights the importance of product standards to minimise excess risks of vaping from poor manufacturing processes or contaminants—standards which have yet to be fully implemented in many countries, including the US and Canada. Although vaping is less harmful than smoking and can play an important role in reducing the harms of tobacco use, this outbreak also serves as a reminder that vaping is not a benign activity. This message is particularly important for young people, who account for most of the pulmonary cases in this outbreak, and for whom vaping has become a popular mode of delivery for recreational drugs.[13]

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