

EVALI: Vaping-related lung disease now has a name and a likely cause

12 November 2019, by Coral Gartner and Wayne Hall



Vitamin E oil is safe to use on the skin, but not to inhale via vaping. Credit: shutterstock.com

More than [2,000 people](#) in the United States have developed serious lung damage in a poisoning outbreak associated with the use of vaping devices this year. At least 39 people have died from the condition.

Most of those affected are young men. Their symptoms, which developed over a few days to several weeks, included cough, shortness of breath, [chest pain](#), nausea, vomiting, abdominal pain, diarrhea, fever, chills, and weight loss.

The United States Centers for Disease Control and Prevention (CDC) has recently named this combination of symptoms—"e-cigarette or [vaping](#) product use associated [lung injury](#)," or EVALI.

Importantly, [it has now implicated vitamin E acetate](#), an ingredient added to illicit cannabis vaping liquids, as the most likely cause of EVALI.

1. What EVALI is and how it's diagnosed

EVALI cases are characterized by pneumonitis ([lung](#) inflammation). Some cases have involved the

accumulation of oil in the lungs, while others have involved an accumulation of white blood cells—a marker of the immune system responding to a threat.

To be classified as EVALI, cases have to satisfy the following [criteria](#):

- having vaped or "dabbed" (inhaled a concentrated cannabis product) in the 90 days before symptoms started
- a chest image showing the presence of a substance denser than air in the lungs (pulmonary infiltrates) or pathology confirming acute lung injury
- absence of lung infection or any alternative plausible medical diagnosis that explains the symptoms.

2. Why this new diagnosis was needed

When investigating the causes of an outbreak like this, it's important to have a clear definition that determines who is and who is not likely to be part of the outbreak.

For example, some people who vape may develop similar symptoms from other lung conditions unrelated to vaping (for example, they may have influenza, or [chronic obstructive pulmonary disease](#) due to a history of cigarette smoking).

If these people were included as outbreak cases it would be more difficult to identify the cause of EVALI.

3. The cause of EVALI

Cases have followed a typical acute outbreak pattern, with most occurring over a number of months. The [peak](#) was in September this year when 463 cases were admitted to hospitals.

This pattern indicates EVALI is a form of acute

poisoning, rather than a condition that has developed from chronic vaping over many years. It's most likely there's something new in vaping products used by these patients that's caused the spike in lung injuries.

[Most people with EVALI](#) have either admitted using, or later been found to have vaped products containing tetrahydrocannabinol (THC), the major psychoactive ingredient in cannabis. They have typically purchased these products from [illicit sources](#).

Laboratory analyses of THC vaping product samples supplied by EVALI cases have found many of these contain vitamin E acetate (oil). Vitamin E acetate is sometimes [added to illicit THC vaping products](#) to dilute and then thicken the liquid to hide the dilution, in the same way other illicit drugs are "cut" with other substances to reduce their purity.

The CDC tested fluid samples collected from the lungs of 29 EVALI cases and found [all samples contained vitamin E acetate](#).

One theory is the oil may be the direct cause of the lung injury, because some of these patients have been diagnosed with lipoid pneumonia (lung inflammation associated with oil inhalation). However, it increasingly looks like a [chemical](#) formed from the vitamin E acetate may be causing the toxicity. Research is continuing to test this hypothesis.

It appears increasingly unlikely standard commercially produced nicotine vaping products are a cause of EVALI.

Of 849 EVALI patients who provided information about the [products they used](#), only 10% reported exclusive use of nicotine-containing products, while 78% reported using THC-containing products. Some EVALI patients who initially denied using THC vaping products [were later found to have used them](#).

EVALI has not been evident in other countries with widespread use of nicotine vaping products but little use of THC vaping products, [such as the UK](#).

4. How EVALI can be treated

Many patients with EVALI have developed a severe illness that requires hospitalization. In the most serious cases, [treatment](#) has involved intubation and mechanical ventilation because the patient cannot breathe on their own.

Most patients have been treated with corticosteroids to reduce the inflammation on the lungs. Antiviral and antibiotic medicines may also be given on a case-by-case basis.

EVALI patients are strongly advised to avoid vaping and cigarette smoking, so treatment may be needed to address dependence on nicotine and/or cannabis, such as behavioral support and non-inhaled nicotine replacement therapies like nicotine gum and patches.

5. How you can avoid EVALI

The US authorities recommend consumers [do not use any cannabis or THC vaping products](#), especially those purchased illegally.

Only one EVALI case has been reported outside the US, [in Canada](#), but it's difficult to rule out the possibility illicit THC vaping products sold in other countries may also be contaminated with the causative agent.

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