

What is EVALI?

A prominent respiratory physician says Australian doctors should be aware of E-cigarette or Vaping Associated Lung Injury.

Shortness of breath, cough or chest pain are potential symptoms of EVALI.

Associate Professor Louis Irving recalls the condition coming to light in 2019.

‘There were sporadic cases in the US of young people presenting with an acute mysterious illness, often with respiratory failure, and some of them actually died,’ he told *newsGP*.

‘And it was like an atypical pneumonia. A flu-like illness [with] hypoxia and respiratory failure.

‘Then it became apparent that it was associated with usually young people, [who were] usually vaping with e-cigarettes.’

Associate Professor Irving is talking about E-cigarette or Vaping-Associated Lung Injury (EVALI), a flu-like illness that was first [identified](#) in the US in early 2019.

More than 2800 cases of EVALI have since been [reported](#) to the US Centers for Disease Control and Prevention (CDC) and at least 68 people have died from the condition.

Associate Professor Irving, Director of Respiratory and Sleep Medicine at the Royal Melbourne Hospital, says it took time for the condition to be recognised.

‘And then the [CDC] put out an alert describing this new syndrome,’ he said.

That CDC [alert](#), updated in February this year, reported it was investigating a ‘national outbreak’ of EVALI.

At that time, the CDC reported emergency department visits related to e-cigarettes or vaping were declining, after increasing in August 2019 and peaking in September.

Associate Professor Irving says he is unsure if there are any described cases of EVALI in Australia.

However, he says it is possible for it to occur here, especially considering vaping is on the rise in Australia, with *newsGP* [reporting](#) in October that nicotine vaping increased from 4.4% of people who smoke in 2016, to 9.7% in 2019.

Who is at risk?

According to the [Department of Health](#), ‘anyone using e-cigarette products or who is exposed to e-cigarette emissions and/or e-liquids is potentially at risk’.

This includes young people, and pregnant women and their unborn children.

Potential [symptoms of EVALI](#) include:

- respiratory (shortness of breath, cough or chest pain)
- gastrointestinal (nausea, vomiting or diarrhoea)
- non-specific (fatigue, fever or weight loss).

How is EVALI diagnosed?

Associate Professor Irving says the diagnosis is made on a combination of:

- exposure to or history of vaping
- a presentation of a flu-like illness with lung consolidation
- exclusion of other causes.

‘Taking an exposure history is always very important,’ Associate Professor Irving said.

He always asks four key questions:

- Did you have asthma, hay fever or eczema as a child, or is there a family history of atopy?
- Do you, or did you previously, smoke (including tetrahydrocannabinol [THC])?
- What work do you do, and are you exposed to chemicals, fumes, dust or birds at work (or at home)?
- Do you take any medications?

‘If you ask those four background questions you’ve got predisposing factors for almost everything in respiratory medicine covered,’ he said.

When it comes to investigations, new research published in [JAMA Network Open](#) in November 2019, found that patients with EVALI typically present as having a flu-like illness with elevated inflammatory markers and an organising pneumonia pattern on computed tomography (CT) imaging.

Meanwhile, bronchoscopy showed lipid-laden macrophages and had a high rate of false-positive results for infection.

These findings suggest EVALI has a ‘characteristic clinical and radiographic presentation’, the authors wrote, and that bronchoscopy is of limited use in evaluation.

Associate Professor Irving says the treatment for EVALI should involve immediate cessation of the use of vaping devices.

The use of corticosteroids may also be indicated.

In severe cases, patients will need to be treated in ICU on a ventilator.

If a patient is placed on a ventilator for acute lung injury, Associate Professor Irving says, long-term effects are likely.

However, he says that because the condition was only described for the first time last year, the long-term effects of less severe illness remains unknown.

‘But my understanding is, in the majority of cases, if they survive the acute event they recover,’ he said.

Anyone who uses e-cigarette products or who is exposed to e-cigarette emissions and/or e-liquids is said to be potentially at risk of EVALI.

What is the link between EVALI and THC, vitamin E acetate and other substances?

A July article published in *The Medical Journal of Australia* states that THC-containing products with vitamin E additives are implicated in the pathogenesis of EVALI.

The CDC also notes that data showed THC-containing e-cigarette or vaping products, particularly from informal sources such as friends and family, were linked to most EVALI cases and played a ‘major role’ in the outbreak.

Furthermore, the CDC reported that vitamin E acetate was found in patient lung fluid samples of patients with EVALI, and was not found in lung fluid of patients without the condition.

Associate Professor Irving explains that vitamin E may be present in e-cigarettes as either a naturally occurring product, or as a contaminant.

‘Either way, vitamin E breaks down at high temperatures and generates a toxic substance that generates acute lung injury,’ he said.

There may be other substances contributing to the issue of EVALI.

‘One of the features of these [vaping] devices is that the temperatures are very high,’ Associate Professor Irving said.

‘I remember going to an e-cigarette meeting at least 10 years ago where people were speculating

that because of the very high temperature, eventually something could go wrong.’

According to Associate Professor Irving, specialists at the time were saying that even substances considered to be ‘safe’, such as aromatic organic compounds used as flavouring, could turn out to be unsafe when vaped.

‘And so this is probably an example of exactly that,’ he said.

Take-home messages

‘Firstly, be aware that there is this condition,’ Associate Professor Irving said.

The second message is that ‘not everything that presents with a flu-like illness and a lung infiltrate is pneumonia’.

Associate Professor Irving says there is always a differential diagnosis for respiratory presentations and it is important for clinicians to now include related illness such as EVALI as a potential differential in patients who vape.

Associate Professor Irving says other differential diagnoses include drugs such as amiodarone, bleomycin and immunotherapy, exposure to fungi, other atypical organisms and birds.

‘[These] can all cause a non-infective pneumonitis that mimics pneumonia,’ he said.

‘Not everything that presents as an acute “pneumonia” is community-acquired pneumonia.’