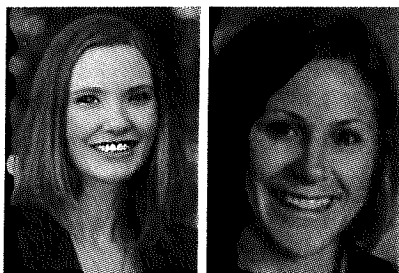


# SEVERE LUNG INJURY LINKED TO E-CIGARETTE USE

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**A** new lung malady linked to electronic cigarette use is sweeping the nation. It's being called EVALI – E-cigarette or

Vaping product use Associated with Lung Injury.

It began on June 11 when a teenager arrived at the Children's Hospital of Wisconsin, suffering from shortness of breath and weight loss, too fatigued to perform routine activities. Physicians and other medical professionals started connecting the dots to other young and otherwise healthy patients with similar symptoms.

The only common denominator was that all had used electronic cigarettes.

In his excellent article in the October issue of *Louisville Medicine*, "Curbing the Electronic Cigarette Epidemic: Rationale for a Nicotine-Level Based Tax," Gordan Tobin, MD, alluded to EVALI,

pointing out that, as of September, there had been five deaths and more than 450 cases through September.

Since September, however, the outbreak has rapidly grown. As of November 13, 2019, 2,172 cases had been reported to CDC from 49 states (all but Alaska), the District of Columbia and two US territories. There had been 42 deaths in 24 states, including one death of an Indiana resident who presented at a Louisville hospital. As of November 8, 31 cases were under investigation in Kentucky with 11 probable cases and three confirmed cases. Two of the cases under investigation involve Louisville residents.

Based upon medical chart abstraction data submitted to CDC, 95% (323/339) of patients diagnosed with EVALI initially experienced respiratory symptoms (e.g., cough, chest pain and shortness of breath), and 77% (262/339) had gastrointestinal symptoms (e.g., abdominal pain, nausea, vomiting and diarrhea). Gastrointestinal symptoms preceded respiratory symptoms in some patients. Respiratory or gastrointestinal symptoms were accompanied by constitutional symptoms such as fever, chills and weight loss among

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85% (289/339) of patients.

While this sudden outbreak is concerning and tragic, it certainly should not come as a surprise. E-cigarettes are largely unregulated products. No government entity oversees what goes into them and no authority tests them for safety.

All cases in the outbreak have been linked to the use of electronic cigarettes or other vaping products. Most patients have reported a history of using products containing THC, tetrahydrocannabinol, the principal psychoactive constituent of cannabis.

Last month, the CDC announced a *possible* cause of the lung injury may be vitamin E acetate, a common additive in many cosmetic and food products. Although vitamin E acetate is considered safe when applied to the skin or consumed, new evidence indicates that it may be dangerous when inhaled. CDC laboratory test results of bronchoalveolar lavage (BAL) samples from 29 patients submitted to CDC from 10 states identified vitamin E acetate in *all* BAL fluid samples. THC was identified in 82% of the samples and nicotine was identified in 62% of the samples.

As of this article going to print, investigators have not *conclusively* narrowed down the cause of this very serious lung injury to any specific group of vaping products, and the CDC continues to recommend that people should refrain from vaping while the investigation is under way.

## ADVICE TO JEFFERSON COUNTY RESIDENTS

Given what we presently know about the outbreak, here is what we are advising Jefferson County residents:

1. Vaping is not safe. It's causing deaths across the country, and right now, there is no way to know if products purchased in retail outlets are safer than products bought on the street.
2. Adults who are using e-cigarettes containing nicotine to quit cigarette smoking, *should not return to smoking cigarettes*. If you have patients who are using e-cigarettes to quit smoking, please refer them to cessation classes. The Department of Public Health and Wellness offers free smoking and vaping cessation classes with FDA approved nicotine replacement products such as patches and gum. Call us at 574-STOP (574-7867).
3. Parents, teachers and mentors, and health care providers should discuss this outbreak with children. Let them know about the life-threatening consequences of vaping and e-cigarette use. If they are vaping, treat it as a serious medical issue. Help them stop vaping.

We are further advising people who have recently used an e-cigarette or vaping product and have symptoms like those reported in this outbreak, to see a physician. Those who persist in using e-cigarettes and other vaping devices should not buy these products "off the street," and should not modify or add any substances to these products.

## YOUNG PEOPLE DISPROPORTIONATELY AFFECTED

Perhaps the most concerning thing about the outbreak is that it is disproportionately affecting our young people. Approximately 80% of patients are under 35 years old, 16% are under 18 and 21% are between the ages of 18 and 20. This makes sense since it is mostly younger people who use e-cigarettes and vaping products.

A cross-sectional survey conducted this year, that included more than 19,000 participants published in the November issue of the Journal of the American Medical Association (JAMA), found that nearly one-third (27.5%) of high school students and 10.5% of middle school students use e-cigarettes.

## POLICY INITIATIVES

In 2017 Louisville Metro Government, with help and support from the Greater Louisville Medical Society, included e-cigarettes and other vaping and hookah products under its Smoke Free Ordinance. Now one of the strongest such ordinances in the United States, the ordinance prohibits conventional tobacco products, e-cigarettes and other vaping and hookah products in indoor public places and worksites. We encourage everyone to call 311 to report a violation. However, we need to do more.

If the Trump administration does not follow through on the commitment it made in September to ban flavored e-cigarettes and vaping products, and to raise the legal age for purchasing tobacco products, including vaping products to 21, Kentucky should do so.

Right now, e-cigarettes are the only tobacco product sold in Kentucky that is not subject to a state excise tax, yet they're the most popular tobacco product for youth. Only eight percent of Kentucky adults use e-cigs, but 27.5% of Kentucky high school seniors use them. We support the Foundation for a Healthy Kentucky's campaign to put an excise tax on e-cigarettes that is at least equivalent to the tax on conventional cigarettes. Making these products more expensive will curb their use among young people, as we have shown reduced cigarette use by young people in Kentucky when the tax was last raised on cigarettes.

We also need increased funding for prevention and cessation. This year, Kentucky took in \$354 million in tobacco taxes and another \$117 million in tobacco master settlement funds (total \$471 million). Yet the state public health department was given only \$3.7 million to prevent youth tobacco use and help smokers quit.

## CLINICAL EVALUATION

EVALI is a diagnosis of exclusion because, at present, no specific test or marker exists for its diagnosis. Health care providers should consider multiple etiologies, including the possibility of EVALI and concomitant infection.

### History

» Ask about respiratory (e.g., cough, chest pain and shortness of

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breath), gastrointestinal (e.g., abdominal pain, nausea, vomiting and diarrhea), and constitutional symptoms (e.g., fever, chills and weight loss) for patients who report a history of using e-cigarette, or vaping, products. Gastrointestinal symptoms preceded respiratory symptoms in some patients.

- » Ask patients about recent use of e-cigarette, or vaping, products and ask about types of substances used (e.g., THC, cannabis [oil, dabs], nicotine, modified products or the addition of substances not intended by the manufacturer); product source, specific product brand and name; duration and frequency of use, time of last use; product delivery system, and method of use (aerosolization, dabbing, or dripping).

#### Physical Examination

- » Assess vital signs and oxygen saturation via pulse oximetry.
- » Pulmonary findings on auscultation have often been unremarkable.

#### Laboratory Testing

- » Initial laboratory evaluation should be guided by clinical findings.
  - Consider complete blood count with differential, liver transaminases and inflammatory markers (e.g., erythrocyte sedimentation rate and C-reactive protein), which may be elevated (Layden JE, 2019).
  - Consider conducting urine toxicology testing, with informed consent, including testing for THC.
- » Infectious disease evaluation to rule out other etiologies might include
  - Respiratory viral panel including influenza testing during flu season, *Streptococcus pneumoniae*, *Legionella pneumophila*, *Mycoplasma pneumoniae*, endemic mycoses, and opportunistic infections.

#### Imaging

- » Chest radiograph (CXR).
- » Consider chest computed tomography (CT) for evaluation of severe or worsening disease, complications, other illnesses, or when CXR result does not correlate with clinical findings.
- » Radiographic findings consistent with EVALI include pulmonary infiltrates on CXR and opacities on CT scan. (Henry TS, 2019; Schier JG, 2019)

#### Other Considerations

- » Further evaluation of patients meeting inpatient admission criteria might include:
  - Consultation with pulmonary, critical care, medical toxicology, infectious disease, psychology, psychiatry, and

addiction medicine specialists.

- Additional testing with bronchoalveolar lavage (BAL) or lung biopsy as clinically indicated, in consultation with pulmonary specialists.

## WHAT PHYSICIANS CAN DO

We need your help! Physicians can play a pivotal role in helping to identify the specific cause of this very serious lung injury while protecting and treating their patients.

Here is how you can help:

1. Report cases of lung injury of unclear etiology and a history of e-cigarette or vaping product use within the past 90 days to the Kentucky Department for Public Health using the EPID 200 form and submit via secure fax at 502-696-3803. The illness name can be listed as "EVALI." **Please also include all patient medical records pertaining to the lung injury.** Reporting of lung injury cases may help the CDC determine the exact cause.
2. Ask all patients who report e-cigarette, or vaping, product use within the last 90 days about signs and symptoms of respiratory illness.
3. If e-cigarette, or vaping, product use is suspected as a possible etiology of a patient's lung injury, obtain detailed history.
4. After contacting the Kentucky Department for Public Health, determine if any remaining product, including devices and liquids, is available for testing. Please ship product samples to the Kentucky Division of Laboratory Services, Att: Rachel Zimmer or Leigh Ann Bates, 100 Sower Blvd., Ste 204, Frankfort, KY 40601. Product may include the e-cigarette or vaping device (no lithium batteries), liquid, refill pods and cartridges. These may be shipped in packaging of your choice. They do not fall under DOT hazardous material regulation.
5. Advise adult patients who are using e-cigarettes for smoking cessation not to return to cigarettes but to contact the Department of Public Health and Wellness at 574-STOP (574-7867). We offer free smoking and vaping cessation classes with FDA approved nicotine replacement products such as patches and gum.

This outbreak is evolving quickly and changing rapidly. Please consult the CDC website at [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html) for the most current information. Thank you in advance for your help in bringing the EVALI outbreak under control. ♣

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