Outbreak of Lung Illness Associated with Using E-cigarette Products

Investigation Notice

Posted September 6, 2019 at 9:50pm ET

CDC, U.S. Food and Drug Administration (FDA), state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of severe pulmonary disease associated with e-cigarette product (devices, liquids, refill pods, and/or cartridges) use. This investigation is ongoing and has not identified a cause, but all reported cases have a history of using e-cigarette products.

E-cigarettes are devices that deliver an aerosol to the user by heating a liquid that usually contains nicotine, flavorings, and other chemicals. E-cigarettes can also be used to deliver marijuana or other substances.

Latest Outbreak Information

- As of September 6, 2019, over 450 possible cases of lung illness associated with the use of e-cigarette products have been reported to CDC from the following 33 states and 1 U.S. territory: AR, CA, CO, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, MI, MN, MT, NC, NE, NJ, NM, NY, OH, OR, PA, SC, TN, TX, UT, VA, VT, WI, WV, and the U.S. Virgin Islands). These numbers may change frequently.
- Five deaths have been confirmed in California, Illinois, Indiana, Minnesota, and Oregon.
- CDC worked with states to create a case definition to classify cases in a consistent way. State investigators determine if cases are confirmed or probable after examining the medical records of suspected cases and consulting with the clinical care team to exclude other possible causes. Unlike nationally reportable conditions, these cases are requiring clinicians and public health to interview patients to determine product use and individual behaviors.
- CDC will report numbers of confirmed and probable cases once states have finalized their classification of cases.
- We expect that states and clinicians may look back for older cases based on CDC’s case definition. States are in the process of classifying current possible cases as well as older cases.
- No evidence of infectious diseases has been identified; therefore lung illnesses are likely associated with a chemical exposure. Initial published reports from the investigation point
to clinical similarities among cases. Patients report e-cigarette use and similar symptoms and clinical findings. These align with the CDC health advisory released August 30, 2019.

- The investigation has not identified any specific substance or e-cigarette product that is linked to all cases. Many patients report using e-cigarette products with liquids that contain cannabinoid products, such as tetrahydrocannabinol (THC).
- These investigations are ongoing. CDC will provide updates when more information is available.

Recommendations for the Public

While this investigation is ongoing, consider not using e-cigarette products.

If you do use e-cigarette products and you experience symptoms like those reported in this outbreak, seek medical care promptly. CDC and the FDA will continue to alert the public throughout this investigation.

Regardless of the ongoing investigation:

- **Youth and young adults should not use e-cigarette products.**
- **Women who are pregnant should not use e-cigarette products.**
- Adults who do not currently use tobacco products should not start using e-cigarette products.
- If you do use e-cigarette products, you should not buy these products off the street (for example, e-cigarette products with THC or other cannabinoids).
- You should not modify e-cigarette products or add any substances to these products that are not intended by the manufacturer.
- Adult smokers who are attempting to quit should use evidence-based treatments, including counseling and FDA-approved medications. If you need help quitting tobacco products, including e-cigarettes, contact your doctor or other medical provider.
If you are concerned about your health after using an e-cigarette product, you can also call your local poison control center at 1-800-222-1222.

CDC and FDA encourage the public to submit detailed reports of any unexpected health or product issues related to tobacco or e-cigarette products to the FDA via the online Safety Reporting Portal.

Symptoms of Severe Pulmonary Disease Reported by Some Patients in This Outbreak

- Patients in this investigation have reported symptoms such as:
  - cough, shortness of breath, or chest pain
  - nausea, vomiting, or diarrhea
  - fatigue, fever, or weight loss
- Some patients have reported that their symptoms developed over a few days, while others have reported that their symptoms developed over several weeks. A pulmonary infection does not appear to be causing the symptoms, which have generally not improved with antibiotic treatment alone.

Recommendations for Healthcare Providers
As this investigation continues, CDC encourages clinicians to report possible cases of e-cigarette-associated pulmonary disease to their local or state health department for further investigation.

If e-cigarette product use is suspected as a possible cause for a patient’s lung disease, a detailed history of the substances used, the sources, and the devices used should be obtained, as outlined in the HAN, and efforts should be made to determine if any remaining product, devices, and liquids are available for testing.

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Recommendations for Local and State Public Health Departments
CDC encourages local and state health departments to notify CDC about possible cases promptly, and contact CDC for the most recent versions of the surveillance case definitions, reporting guidelines, and case investigation forms.

Local and state public health departments that need data collection tools should email CDC at eocevent101@cdc.gov.

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Investigation Details
August 30, 2019

CDC, several states, and federal partners are investigating a multistate outbreak of severe pulmonary disease associated with using e-cigarette products. The investigation is ongoing and has not identified a cause, but all reported cases have indicated use of e-cigarette products.
Based on reports from several states, patients have experienced respiratory symptoms (cough, shortness of breath, or chest pain), and some have also experienced gastrointestinal symptoms (nausea, vomiting, or diarrhea) or non-specific symptoms (fatigue, fever, or weight loss). Some patients have reported that their symptoms developed over a few days, while others have reported that their symptoms developed over several weeks. Some patients have reported gastrointestinal symptoms began before respiratory symptoms. Fever, elevated heart rate, and elevated white blood cell count have been reported, even though no infectious disease has been identified. Many patients sought medical care in ambulatory settings, sometimes over several visits, before they were admitted to the hospital.

Many patients have required medical treatment with supplemental oxygen. Some required assisted ventilation. Some patients have been treated with corticosteroids with demonstrated improvement. Evidence does not suggest an infectious disease is the cause of the severe pulmonary disease. Antibiotic therapy alone has not consistently been associated with clinical improvement.

**Investigation of the Outbreak**

CDC, FDA, state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of pulmonary disease associated with e-cigarette product (devices, liquids, refill pods, and/or cartridges) use. This ongoing investigation seeks to identify the exposures, demographic, clinical, and laboratory features and behaviors of patients. All patients have reported e-cigarette product use. Some patients have reported using e-cigarettes containing cannabinoid products, such as THC. To date, the investigation has not identified any single substance or e-cigarette product that has been consistently associated with illness.

State health departments are working with FDA to enable collection of e-cigarette product specimens for testing at the U.S. FDA Forensic Chemistry Center.

Content source: [Office on Smoking and Health](https://www.cdc.gov/tobacco/basic_info/quit_smoking/), [National Center for Chronic Disease Prevention and Health Promotion](https://www.cdc.gov/ncchp/)
Severe Pulmonary Disease Associated with Using E-Cigarette Products

Summary

The Centers for Disease Control and Prevention (CDC) is providing: 1) background information on the forms of e-cigarette products, 2) information on the multistate outbreak of severe pulmonary disease associated with using e-cigarette products (devices, liquids, refill pods, and cartridges), and 3) clinical features of patients with severe pulmonary disease. This health advisory also provides recommendations for clinicians, public health officials, and the public based on currently available information.

General Background

E-cigarettes typically contain nicotine, most also contain flavorings and other chemicals, and some may contain marijuana or other substances. They are known by many different names and come in many shapes, sizes and device types. Devices may be referred to as “e-cigs,” “vapes,” “e-hookahs,” “vape pens,” “mods,” tanks, or electronic nicotine delivery systems (ENDS). Some e-cigarette devices resemble other tobacco products such as cigarettes; some resemble ordinary household items such as USB flash drives, pens, and flashlights; and others have unique shapes. Use of e-cigarettes is sometimes referred to as “vaping” or “juuling.” E-cigarettes used for dabbing are sometimes called “dab” pens.

E-cigarettes can contain harmful or potentially harmful substances, including nicotine, heavy metals (e.g., lead), volatile organic compounds, and cancer-causing chemicals. Additionally, some e-cigarette products are used to deliver illicit substances; may be acquired from unknown or unauthorized (i.e., “street”) sources; and may be modified for uses that could increase their potential for harm to the user. For example, some e-cigarette pods or cartridges marketed for single use can be refilled with illicit or unknown substances. In addition, some e-
cigarette products are used for “dripping” or “dabbing.” Dripping involves dropping e-cigarette liquid directly onto the hot coils of an e-cigarette which can result in high concentrations of compounds (e.g., tetrahydrocannabinol [THC] and cannabinoid compounds). Dabbing involves superheating substances such as “budder”, butane hash oil (BHO), and “710” that contain high concentrations of THC and other plant compounds (e.g., cannabidiol [CBD]).

Youth, young adults, pregnant women, as well as adults who do not currently use tobacco products should not use e-cigarettes. E-cigarettes containing nicotine have the potential to help some individual adult smokers reduce their use of and transition away from cigarettes. However, e-cigarettes are not currently approved by the Food and Drug Administration (FDA) as a quit smoking aid, and the available science is inconclusive on whether e-cigarettes are effective for quitting smoking.

**Outbreak Background**

As of August 27, 2019, 215 possible cases have been reported from 25 states and additional reports of pulmonary illness are under investigation. One patient (in Illinois) with a history of recent e-cigarette use was hospitalized with severe pulmonary disease and subsequently died. Although the etiology of e-cigarette-associated pulmonary disease is undetermined, epidemiologic investigations in affected states are ongoing to better characterize the exposures, demographic, clinical, and laboratory features and behaviors of patients. All patients have reported using e-cigarette products. The exact number is currently unknown, but many patients have reported using e-cigarettes containing cannabinoid products such as THC or CBD.

Based on reports from several states, patients have experienced respiratory symptoms (cough, shortness of breath, or chest pain), and some have also experienced gastrointestinal symptoms (nausea, vomiting, or diarrhea) or non-specific constitutional symptoms (fatigue, fever, or weight loss). Symptoms typically develop over a period of days but sometimes can manifest over several weeks. Gastrointestinal symptoms sometimes preceded respiratory symptoms. Fever, tachycardia, and elevated white blood cell count have been reported in the absence of an identifiable infectious disease. Many patients have sought initial care in ambulatory settings, some with several visits, before hospital admission.

Radiologic findings have varied and are not present in all patients upon initial presentation. Bilateral pulmonary infiltrates and diffuse ground-glass opacities have been reported. Many patients required supplemental oxygen, some required assisted ventilation and oxygenation, and some were intubated. Some patients have been treated with corticosteroids with demonstrated improvement. Antimicrobial therapy alone has not consistently been associated with clinical improvement. Assessment for infectious etiologies has been completed in many patients without an identified infectious cause. Several patients from one state have been diagnosed with lipoid pneumonia based on clinical presentation and detection of lipids within bronchoalveolar lavage samples stained specifically to detect oil.
All patients have reported using e-cigarette products and the symptom onset has ranged from a few days to several weeks after e-cigarette use. Within two states, recent inhalation of cannabinoid products, THC or cannabidiol, have been reported in many of the patients. To date, no single substance or e-cigarette product has been consistently associated with illness. CDC is working closely with state health departments to facilitate collecting product specimens for testing at the U.S. FDA Forensic Chemistry Center.

**Recommendations for Clinicians**

1. Report cases of severe pulmonary disease of unclear etiology and a history of e-cigarette product use within the past 90 days to your state or local health department. Reporting of cases may help CDC and state health departments determine the cause or causes of these pulmonary illnesses.
2. Ask all patients who report e-cigarette product use within the last 90 days about signs and symptoms of pulmonary illness.
3. If e-cigarette product use is suspected as a possible etiology of a patient’s severe pulmonary disease, obtain detailed history regarding:
   - Substance(s) used: nicotine, cannabinoids (e.g., marijuana, THC, THC concentrates, CBD, CBD oil, synthetic cannabinoids [e.g., K2 or spice], hash oil, Dank vapes), flavors, or other substances
   - Substance source(s): commercially available liquids (i.e., bottles, cartridges, or pods), homemade liquids, and re-use of old cartridges or pods with homemade or commercially bought liquids
   - Device(s) used: manufacturer; brand name; product name; model; serial number of the product, device, or e-liquid; if the device can be customized by the user; and any product modifications by the user (e.g., exposure of the atomizer or heating coil)
   - Where the product(s) were purchased
   - Method of substance use: aerosolization, dabbing, or dripping
   - Other potential cases: sharing e-cigarette products (devices, liquids, refill pods, or cartridges) with others
4. Determine if any remaining product, including devices and liquids, are available for testing. Testing can be coordinated with the local or state health departments.
5. Consider all possible causes of illness in patients reporting respiratory and gastrointestinal symptoms and of e-cigarette product use. Evaluate and treat for other possible causes of illness (e.g., infectious, rheumatologic, neoplastic) as clinically indicated. Consider consultation with specialists (pulmonary, infectious disease, critical care, medical toxicology) as appropriate.
6. Clinical improvement of patients with severe pulmonary disease associated with e-cigarette use has been reported with the use of corticosteroids. The decision to use corticosteroids should be made on a case-by-case basis based on risks and benefits and the likelihood of other etiologies.
7. Lipoid pneumonia associated with inhalation of lipids in aerosols generated by e-cigarettes has been reported based on the detection of lipid-laden alveolar macrophages obtained by bronchoalveolar lavage (BAL) and lipid staining (e.g., oil red O). The decision about whether to perform a BAL should be based on individual clinical circumstances.
8. Lung biopsies have been performed on some patients. If a lung biopsy is obtained, lipid staining may be considered during pathologic examination, and is best performed on fresh tissue.
Routine pathology tissue processing (including formalin-fixation and paraffin-embedding) can remove lipids. Conducting routine tissue processing and histopathologic evaluation is still important. Consider consultation with specialists in pulmonary medicine and pathology to help inform any evaluation plan.

9. Patients who have received treatment for severe pulmonary disease related to e-cigarette product use should undergo follow-up evaluation as clinically indicated to monitor pulmonary function.

**Recommendations for Public Health Officials**

1. State public health officials should promptly notify CDC about possible cases via [VapingAssocIllness@cdc.gov](mailto:VapingAssocIllness@cdc.gov).
2. Contact CDC at [VapingAssocIllness@cdc.gov](mailto:VapingAssocIllness@cdc.gov) for case classification criteria, reporting guidelines, case investigation forms, and questions about this outbreak.
3. Consider conducting case-finding activities that use existing data sources (e.g., local poison control center, coroner and medical examiner’s office, and other applicable surveillance systems including syndromic surveillance). CDC has developed two working syndromic surveillance definitions (one version with specific symptoms and a second focused on e-cigarette product use). CDC will be programming these definitions in CDC’s National Syndromic Surveillance Program’s BioSense/ESSENCE platform for case-finding within the platform.
4. Consider asking the medical examiner or coroner’s office and other pathologists to report possible cases, especially those without an alternative, likely diagnosis. If individuals are identified after death or at autopsy who showed signs of severe pulmonary disease as described above, medical examiners and coroners are encouraged to report the cases to their local or state health department. Thorough sampling of trachea, bronchi, and lung parenchyma with collection of fresh lung tissue for staining of lipids (e.g., oil red O) and submission of formalin-fixed, paraffin-embedded tissues for routine histopathology are recommended. For further consultation, public health officials can contact CDC’s Infectious Diseases Pathology Branch at [pathology@cdc.gov](mailto:pathology@cdc.gov).
5. State health department officials seeking technical assistance with an epidemiologic investigation can contact CDC at [VapingAssocIllness@cdc.gov](mailto:VapingAssocIllness@cdc.gov). State health department officials seeking technical assistance with laboratory testing can discuss with their state health department laboratories or contact CDC at [VapingAssocIllness@cdc.gov](mailto:VapingAssocIllness@cdc.gov).

**Recommendations for the Public**

1. While this investigation is ongoing, if you are concerned about these specific health risks, consider refraining from using e-cigarette products.
2. Regardless of the ongoing investigation, anyone who uses e-cigarette products should not buy these products off the street (e.g., e-cigarette products with THC, other cannabinoids) and should not modify e-cigarette products or add any substances to these products that are not intended by the manufacturer.
3. Regardless of the ongoing investigation, e-cigarette products should not be used by youth, young adults, pregnant women, as well as adults who do not currently use tobacco products. If you use e-cigarette products, monitor yourself for symptoms (e.g., cough, shortness of breath,
chest pain) and promptly seek medical attention if you have concerns about your health. CDC and FDA will continue to advise and alert the public as more information becomes available.

4. Adult smokers who are attempting to quit should use evidence-based treatments, including counseling and FDA-approved medications. If you who need help quitting tobacco products, including e-cigarettes, contact your doctor.

5. If you are concerned about harmful effects from e-cigarette products, call your local poison control center at: 1-800-222-1222.

6. We encourage the public to submit detailed reports of any unexpected tobacco or e-cigarette-related health or product issues to the FDA via the online Safety Reporting Portal: [https://www.safetyreporting.hhs.gov](https://www.safetyreporting.hhs.gov).

References


