

Key Points — Enterovirus D68 in the United States, 2014

Note: Newly added information is in red.

- In 2014, the United States experienced a nationwide outbreak of enterovirus D68 (EV-D68) associated with severe respiratory illness. Reports from states through the middle of fall indicated reduced EV-D68-like illness activity. Additionally, toward the end of fall, CDC received and confirmed significantly fewer specimens for EV-D68.
 - Almost all of the confirmed cases were among children, many whom had asthma or a history of wheezing.
 - Additionally, there were likely been millions of mild EV-D68 infections for which people did not seek medical treatment and/or get tested.
 - **The timing of the 2014 EV-D68 season during summer and fall was typical of other enteroviruses.**
 - **However, like many other respiratory viruses, people can get infected with enteroviruses year round, so sporadic EV-D68 infections may continue to occur.**
- From mid-August to **January 8**, 2014, CDC or state public health laboratories confirmed a total of **1,153** people in 49 states and the District of Columbia (AL, AR, AZ, CA, CO, CT, DE, FL, GA, HI, IL, IN, IA, ID, KS, KY, LA, MA, ME, MD, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WV, WI, WY) with respiratory illness caused by EV-D68. This indicates that at least one case was detected in each state listed but does not indicate how widespread infections were in each state.
 - CDC received about 2,600 specimens for enterovirus lab testing during this time, which is substantially more than usual.
 - About 36% of those tested positive for EV-D68. About 33% tested positive for a rhinovirus or enterovirus other than EV-D68.
- CDC, working with state health departments, identified at least three separate strains of EV-D68 that caused infections in the United States in 2014. It is common for multiple strains of one enterovirus type to co-circulate in the same year.
 - The strains of EV-D68 that circulated in 2014 were not new. The most prominent strain had been in the United States since 2012; it was not a recent introduction. It is also related to strains of EV-D68 detected in previous years in countries in Europe and Asia.
 - There is no evidence that unaccompanied children brought EV-D68 to the United States; we are not aware of any of these children testing positive for the virus.
- EV-D68 has been detected in specimens from **13** patients who died and had samples submitted for testing.
 - State and local officials have the authority to determine, and release information about, the cause of these deaths. So far, officials have reported that two of the deaths were caused by EV-D68.
- We can't predict whether EV-D68 will be a common type of enterovirus detected in future seasons. That's because a mix of enteroviruses circulates every year, and different types of enteroviruses can be common in different years.
- As in previous years, CDC will continue to work with states by testing specimens for types of enteroviruses, identifying and investigating outbreaks, and monitoring seasonal activity.

General Key Points — Enteroviruses and Enterovirus D68

Background

Enteroviruses

- Enteroviruses are very common viruses; there are more than 100 types.
- In the United States, people are more likely to get infected with enteroviruses in the summer and fall. However, people can get infected year round.
- It is estimated that 10 to 15 million enterovirus infections occur in the United States each year. Tens of thousands of people are hospitalized each year for illnesses caused by enteroviruses.
- Different enteroviruses can cause different illnesses, such as respiratory, febrile rash, and neurologic [e.g., aseptic meningitis (swelling of the tissue covering the brain and spinal cord) and encephalitis (swelling of the brain)].

Enterovirus D68

- EV-D68 was first recognized in California in 1962. Small numbers of EV-D68 have been reported regularly to CDC since 1987. However, in 2014 the number of people with confirmed EV-D68 infection was much greater than that reported in previous years.
- Respiratory illnesses can be caused by many different viruses and have similar symptoms. Not all respiratory illnesses that occurred in 2014 were due to EV-D68.
- EV-D68 has been previously referred to as human enterovirus 68 (or HEV-68) and human rhinovirus 87 (or HRV-87). They are all the same virus. The D stands for enterovirus species D.

Symptoms

- EV-D68 infections can cause mild to severe respiratory illness, or no symptoms at all.
 - Mild symptoms may include fever, runny nose, sneezing, cough, and body and muscle aches.
 - Severe symptoms may include wheezing and difficulty breathing.
- Anyone with respiratory illness should contact their doctor if they are having difficulty breathing, or if their symptoms are getting worse.
- Enteroviruses are known to be one of the causes of acute neurologic disease in children. They most commonly cause aseptic meningitis, less commonly encephalitis, and rarely, acute myelitis and paralysis.
 - CDC is aware of two published reports of children with neurologic illnesses confirmed as EV-D68 infection from cerebrospinal fluid (CSF) testing.

People at risk

- In general, infants, children, and teenagers are most likely to get infected with enteroviruses and become sick. That's because they do not yet have immunity (protection) from previous exposures to these viruses. We believe this is also true for EV-D68. Adults can get infected with enteroviruses, but they are more likely to have no symptoms or mild symptoms.
- Children with asthma may have a higher risk for severe respiratory illness caused by EV-D68 infection.

Transmission

- Since EV-D68 causes respiratory illness, the virus can be found in an infected person's respiratory secretions, such as saliva, nasal mucus, or sputum.
- The virus likely spreads from person to person when an infected person coughs, sneezes, or touches a surface that is then touched by others.

Diagnosis

- EV-D68 can only be diagnosed by doing specific lab tests on specimens from a person's nose and throat.
- Many hospitals and some doctor's offices can test sick patients to see if they have enterovirus infection. However, most cannot do specific testing to determine the type of enterovirus, like EV-D68. CDC and some state health departments can do this sort of testing.
- CDC recommends that clinicians only consider EV-D68 testing for patients with severe respiratory illness and when the cause is unclear.

Treatment

- There is no specific treatment for people with respiratory illness caused by EV-D68 infection.
 - Talk to your child's doctor about the best way to control his or her symptoms.
 - Some people with severe respiratory illness caused by EV-D68 may need to be hospitalized and receive intensive supportive therapy.
- There are no antiviral medications currently available for people who become infected with EV-D68.

Prevention

- You can help protect yourself from getting and spreading EV-D68 by following these steps:
 - Wash hands often with soap and water for 20 seconds
 - Avoid touching eyes, nose and mouth with unwashed hands
 - Avoid close contact such as kissing, hugging, and sharing cups or eating utensils with people who are sick, or when you are sick
 - Cover your coughs and sneezes with a tissue or shirt sleeve, not your hands
 - Clean and disinfect frequently touched surfaces, such as toys and doorknobs, especially if someone is sick

- Stay home when you are sick
- There are no vaccines for preventing EV-D68 infections.
- Children with asthma are at risk for severe symptoms from EV-D68 and other respiratory illnesses. They should follow CDC's guidance to maintain control of their illness during enterovirus season, which occurs each year in the U.S. during summer and fall:
 - Discuss and update your asthma action plan with your primary care provider.
 - Take your prescribed asthma medications as directed, especially long term control medication(s).
 - Be sure to keep your reliever medication with you.
 - Get a flu vaccine when available.
 - If you develop new or worsening asthma symptoms, follow the steps of your asthma action plan. If your symptoms do not go away, call your doctor right away.
 - Parents should make sure the child's caregiver and/or teacher is aware of his/her condition, and that they know how to help if the child experiences any symptoms related to asthma.

CDC's role

- CDC worked with state and local health departments and clinical and state laboratories to
 - enhance their capacity to identify and investigate outbreaks,
 - perform diagnostic and molecular typing tests to detect enteroviruses, and
 - enhance surveillance for enteroviruses to monitor seasonal activity.
- CDC developed, and started using on October 14, 2014, a new, faster lab test for detecting EV-D68, allowing CDC to test and report results within a few days of receiving specimens.
 - CDC's lab test is a real-time reverse transcription polymerase chain reaction, or rRT-PCR, and it identifies all strains of EV-D68 that circulated during 2014. The new test has fewer and shorter steps than the test that CDC and some states were using previously during the EV-D68 outbreak.
 - CDC has made the protocols publicly available on its website (<http://www.cdc.gov/non-polio-enterovirus/hcp/EV-D68-hcp.html>) and is exploring options for providing test kits to state public health labs.
- CDC obtained one complete genomic sequence and six nearly complete genomic sequences from viruses representing the three known strains of EV-D68 that caused infection during 2014.
 - Comparison of these sequences to sequences from previous years shows they are genetically related to strains of EV-D68 that were detected in previous years in the United States, Europe, and Asia.
 - CDC submitted the sequences to GenBank to make them available to the scientific community for further testing and analysis.
- CDC provided information to healthcare professionals, policymakers, general public, and partners in numerous formats, including Morbidity and Mortality Weekly Reports (MMWRs), health alerts, websites, social media, podcasts, infographics, and presentations.

Guidance for Clinicians

- Clinicians should consider EV-D68 infection as a possible cause of acute, unexplained severe respiratory illness, even if the patient does not have fever. For these patients, they should do the following:
 - Consider laboratory testing of respiratory specimens for enteroviruses.
 - Consider EV-D68 testing of specimens that test positive for enterovirus or rhinovirus. State health departments can be approached for diagnostic and molecular typing for enteroviruses. However, contact state or local health department before sending specimens.
 - Follow standard, contact, and droplet infection control measures.
- Report suspected clusters of severe respiratory illness to local and state health departments. EV-D68 is not nationally notifiable, but state and local health departments may have additional guidance on reporting.
- The antiviral drugs pleconaril, pocapavir, and vapendavir, have significant activity against a wide range of enteroviruses and rhinoviruses. CDC has tested these drugs for activity against currently circulating strains of enterovirus D68 (EV-D68), and none of them has activity against EV-D68 at clinically relevant concentrations.

Surveillance

- U.S. healthcare professionals are not required to report known or suspected cases of EV-D68 infection to health departments because it is not a nationally notifiable disease in the United States. At this time, there are no plans to make it nationally notifiable.
- CDC does not have a surveillance system that specifically collects information on EV-D68 infections; no data is currently available regarding the overall burden of morbidity or mortality from EV-D68 in the United States.

- Any data CDC receives about EV-D68 infections or outbreaks are voluntarily provided by labs to CDC's National Enterovirus Surveillance System (NESS), which collects limited data, focusing on circulating types of enteroviruses and parechoviruses.

More information

- CDC Enterovirus D68 in the United States, 2014 website: <http://www.cdc.gov/non-polio-enterovirus/outbreaks/EV-D68-outbreaks.html>
- CDC Enterovirus D68 general website: <http://www.cdc.gov/non-polio-enterovirus/about/EV-D68.html>
- CDC Enterovirus D68 for Health Care Professionals website: <http://www.cdc.gov/non-polio-enterovirus/hcp/EV-D68-hcp.html>
- CDC What Parents Need to Know about Enterovirus D68 webpage: <http://www.cdc.gov/features/evd68/>
- Enterovirus D68 in the United States: Epidemiology, Diagnosis & Treatment, COCA Call, September 16, 2014 (http://www.bt.cdc.gov/coca/calls/2014/callinfo_091614.asp)
- Severe Respiratory Illness Associated with Enterovirus D68 – Multiple States, 2014, Health Alert Network, September 12, 2014 (<http://emergency.cdc.gov/han/han00369.asp>)
- Severe Respiratory Illness Associated with Enterovirus D68 – Missouri and Illinois, 2014, MMWR, September 8, 2014 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6336a4.htm?s_cid=mm6336a4_w)
- Clusters of Acute Respiratory Illness Associated with Human Enterovirus 68 --- Asia, Europe, and United States, 2008--2010, MMWR, September 30, 2011 (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6038a1.htm>)