

# Outbreak of Pertussis in Unified School District #449 — Leavenworth County, August 2013 – October 2013



## **Background**

On September 23, 2013, the Leavenworth County Health Department notified the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section (KDHE) of four laboratory-confirmed cases of pertussis within Pleasant Ridge Elementary in Easton, Kansas. The Leavenworth County Health Department (LCHD) and USD #449, along with KDHE, began an outbreak investigation to identify additional cases, exposed individuals, and to implement prevention and control measures. Further investigation revealed additional epidemiologically-linked cases among the elementary, middle, and high schools of Unified School District (USD) #449, which have a combined student enrollment of 575.<sup>1</sup>

## **Methods**

Confirmed cases were defined as USD #449 students with:

- a cough of at least 14 days with paroxysms and/or post-tussive vomiting, and
  - laboratory confirmation via polymerase chain reaction (PCR) testing, or
  - an epidemiological link to another confirmed case.

Suspect cases were defined as USD #449 students with:

- An acute cough illness of any length, and
  - laboratory confirmation via polymerase chain reaction (PCR) testing, or
  - an epidemiological link to another confirmed case.

In accordance to Kansas Administrative Regulation (K.A.R.) 28-1-6, each case of pertussis was excluded from school for three weeks after cough onset or until a five-day course of antibiotics was completed.

Reported cases of pertussis were interviewed to assess onset date, transmission setting, severity of symptoms, and vaccination status. Antibiotics were recommended for exposed individuals.

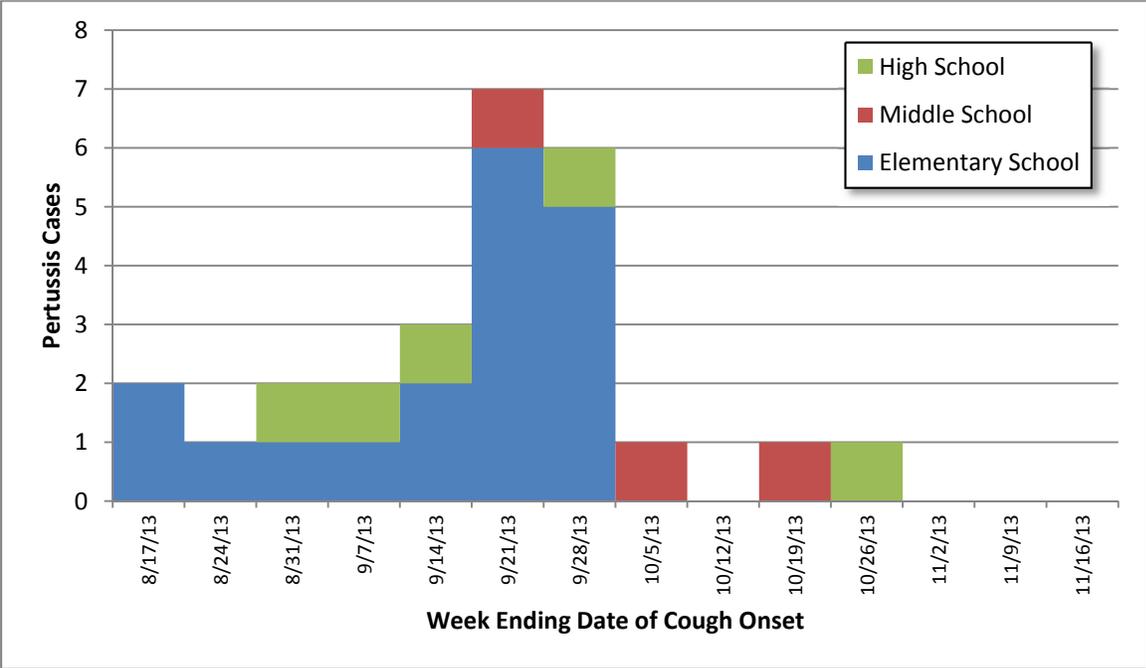
A susceptible contact was defined as a student who had not received any doses of pertussis vaccine and was exposed to a case of pertussis. According to K.A.R. 28-1-20, all individuals that attend a school or childcare setting operated by a school in Kansas are required to be vaccinated against specific diseases. For pertussis, five doses of vaccine are required for children in kindergarten through grade seven (four doses are acceptable if the fourth dose is given after the fourth birthday). Susceptible contacts must be vaccinated within 24 hours of notification to KDHE or excluded for 21 days after the onset of the last reported case.

## **Results**

During this outbreak, 32 cases were identified. Twelve cases were classified as confirmed and 20 were classified as suspect; 26 cases were PCR-positive, and one of the PCR-positive cases also tested positive by bacteriological culture. The cases were distributed among 27 different households.

The index cases were determined to be elementary school students from the same household who had a cough onset during the week ending August 17 (Figure 1). Twenty additional cases were identified in the elementary school, with illness onsets during the week ending September 28. Cases were identified in seven different elementary school classrooms, including six cases in one second grade classroom and five cases in one third grade classroom. Four cases were reported among middle school students, and six cases were reported among high school students. The last reported case had a cough onset date during the week ending October 26. The outbreak investigation was concluded on December 7, when 42 days had passed since the last case's cough onset date.

**Figure 1: Week of cough onset date among pertussis cases associated with Unified School District #449 by school (n=26\*)**



*\*Cough onset date was unknown for six cases*

Cases ranged from five to 17 years of age with a median of 8.5 years. Seventeen cases were female (53%). Cases resided in two Kansas counties.

Complete clinical information was available for 26 cases. While the majority (n=15) experienced a paroxysmal cough and seven reported posttussive vomiting, 11 reported only a cough (Table 1). No hospitalizations were reported.

**Table 1: Clinical information for cases (n=26\*)**

Symptoms	Cases with Symptoms (%)
Paroxysmal cough with posttussive vomiting	7 (27%)
Paroxysmal cough only	8 (31%)
Cough only	11 (42%)

*\*Complete clinical information was unknown for six cases*

Twenty-nine (91%) cases were vaccinated against pertussis; three were unvaccinated due to parental refusal. Three of the initial four students that became ill were unvaccinated. No

susceptible contacts were excluded from school, as the only unvaccinated students identified were cases.

## **Conclusions**

During the course of the outbreak, 32 cases of pertussis were identified among students in three schools within USD #449. Since the outbreak began on the week ending August 17, 13 additional patients with pertussis were reported among Leavenworth County residents, including four cases among students in a high school outside of USD #449.

The school nurse of the affected elementary school examined the immunization records of all classmates of confirmed cases, and verified that all classroom contacts had previously received the recommended four or five doses of pertussis-containing vaccine required for attending Kansas schools. Letters were sent home with students on September 6 and September 26 that informed parents of pertussis at the school, and directed them to contact their medical provider if their child developed pertussis-like symptoms. The LCHD issued a press release and an advisory letter to county medical providers on September 27 to increase community awareness of pertussis.

The LCHD performed case and contact investigations, and recommended that more than 78 close contacts of pertussis cases receive post-exposure prophylaxis (PEP) to prevent infection. In addition, LCHD and the school nurse recommended that all 265 students within Pleasant Ridge Elementary classrooms receive PEP, due to their exposures to the cases within the school. PEP was also recommended for Pleasant Ridge Elementary staff.

The pertussis vaccine is a safe, effective way to prevent the disease. The Advisory Committee for Immunization Practices recommends initial vaccination against pertussis for children aged two to four months and an additional four doses before age seven.<sup>2</sup> The Centers for Disease Control and Prevention (CDC) estimates that these doses are 80-90% effective in preventing disease; vaccination also lowers the likelihood of a severe infection with symptoms such as paroxysmal cough and posttussive vomiting.<sup>3</sup> Because immunity to pertussis wanes 5-10 years after completion of childhood pertussis vaccination, an additional dose of vaccine is recommended for adolescents and adults to reduce morbidity and transmission to at-risk populations.<sup>4,5</sup>

The high vaccination coverage among students may explain why paroxysmal coughing and posttussive vomiting were not reported among 11 cases.

*Report by: Daniel Neises, Kansas Department of Health and Environment; Brenda Brister, Leavenworth County Health Department*  
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Investigation by:

**Leavenworth County Health Department**

500 Eisenhower Road, Suite 101

Leavenworth, KS 66048

[www.leavenworthcounty.org](http://www.leavenworthcounty.org)

**Kansas Department of Health & Environment**

**Bureau of Epidemiology and Public Health Informatics**

1000 SW Jackson St., Suite 075

Topeka, Kansas 66612

<http://www.kdheks.gov/>

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<sup>1</sup> Kansas State Department of Education. District Information. Accessed December 10, 2013, [http://online.ksde.org/rcard/district.aspx?org\\_no=D0449](http://online.ksde.org/rcard/district.aspx?org_no=D0449).

<sup>2</sup> Centers for Disease Control and Prevention. Use of Diphtheria Toxoid-Tetanus Toxoid-Acellular Pertussis Vaccine as a Five-Dose Series. Supplemental Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(RR-13):1-8. Accessed December 10, 2013, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4913a1.htm>

<sup>3</sup> Centers for Disease Control and Prevention. Pertussis: Frequently Asked Questions. Accessed December 10, 2013, <http://www.cdc.gov/pertussis/about/faqs.html>

<sup>4</sup> Centers for Disease Control and Prevention. Preventing Tetanus, Diphtheria, and Pertussis Among Adolescents: Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccines. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2006;55(RR-03):1-34. Accessed December 10, 2013, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5503a1.htm>

<sup>5</sup> Centers for Disease Control and Prevention. Preventing Tetanus, Diphtheria, and Pertussis Among Adults: Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine. Recommendations of the Advisory Committee on Immunization Practices (ACIP) and Recommendation of ACIP, supported by the Healthcare Infection Control Practices Advisory Committee (HICPAC), for Use of Tdap Among Health-Care Personnel. MMWR 2006;55(RR-17):1-33. Accessed December 10, 2013, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm>