

Community-Wide Pertussis Outbreak — Marion County, October 2014 – December 2014



Background

On October 17, 2014, the Marion County Health Department (MCHD) notified the Kansas Department of Health and Environment's (KDHE) Infectious Disease Epidemiology and Response section of two ill persons with pertussis in a daycare in Hillsboro. In the days following, more ill persons with pertussis were identified in the cities of Hillsboro and Marion. The Marion County Health Department and KDHE began an outbreak investigation to identify additional ill persons, exposed persons, and to implement prevention and control measures. Further investigation revealed additional epidemiologically-linked cases among other daycare attendees, a school, and a church.

Methods

Confirmed cases of pertussis were defined as clinically compatible symptoms [cough of at least 14 days with paroxysms, whoop, post-tussive vomiting, or apnea (in an infant less than one year old)] with either laboratory confirmation [culture or polymerase chain reaction (PCR)] or with an epidemiologic link to a confirmed case in a person in Hillsboro or Marion, KS between September 10, 2014 and November 11, 2014.

Ill persons were interviewed to assess symptoms, onset date, duration of cough, and vaccination status. Antibiotic prophylaxis was recommended for household and high-risk contacts of ill persons. A high risk contact was defined as an individual who was in contact with a person with pertussis who may be at risk for developing severe disease or those who may expose persons at high risk for severe disease. This includes infants less than 12 months old, pregnant women in the third trimester, and all persons with pre-existing health conditions that may be exacerbated by a pertussis infection (i.e. immunocompromised individuals and individuals with moderate to severe medically treated asthma).

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

A susceptible contact was defined as an individual who had not received any doses of pertussis containing vaccine and was exposed to an ill person with pertussis. According to K.A.R. 28-1-20, all persons that attend a school or childcare operated by a school in Kansas are required to be vaccinated against specific diseases. In Kansas, five doses of pertussis-containing vaccine are required for children in kindergarten through grade seven (four doses are acceptable if the fourth dose is given after the fourth birthday) and a single dose of tetanus, diphtheria, and acellular pertussis (Tdap) vaccine is required at Grades 7-12 if no previous history of Tdap vaccination regardless of interval since the last vaccination.

In accordance with K.A.R. 28-1-6, susceptible contacts were either vaccinated within 24 hours of notification to KDHE or excluded for 21 days after the last known exposure to a confirmed pertussis case.

Letters were sent to physicians through Marion County Health Department on October 17th to ensure that they were aware of pertussis in the community as well as the recommended reporting, treating, and testing protocols for pertussis.

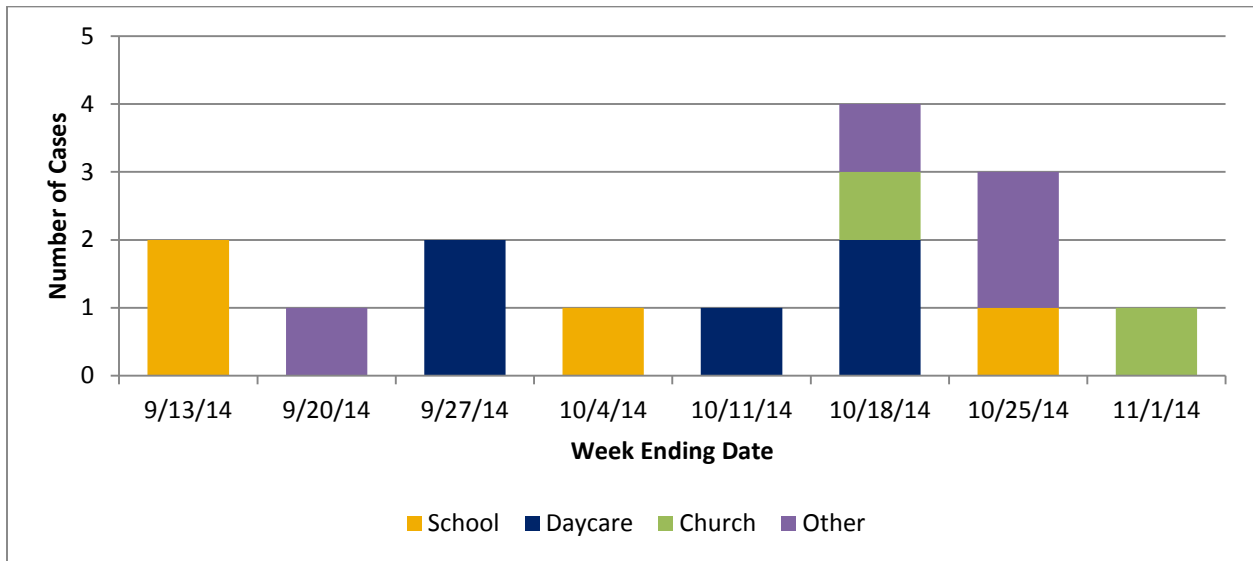
Results

There were 15 ill persons with confirmed cases identified through PCR testing for *Bordetella pertussis*. A total of 46 susceptible contacts were identified and chemoprophylaxis was recommended (Table 1). Four of the individuals who were identified as susceptible contacts eventually became symptomatic with pertussis. The first notification of a potential outbreak involved the identification of ill persons associated with a daycare. These individuals were linked to ill persons with pertussis previously reported in a Marion County school, which represent the index cases (Figure 1). The outbreak was declared over on December 14, 2014, 42 days past the last ill person’s cough onset date.

Table 1: Number of ill persons and contacts per setting

Setting	Number of Ill Persons (%) (n=15)	Number of Contacts (%) (n=46)
School	4 (26.7)	14 (30.4)
Daycare	5 (33.3)	14 (30.4)
Church	2 (13.3)	14 (30.4)
Other	4 (26.7)	4 (8.7)

Figure 1: Ill persons by setting of transmission and week of cough onset date (n=15)



Ill persons ranged from four to 53 years of age with a median of 8 years (Table 2). Ten were male (66.7%).

Table 2: Distribution of ill persons by age group (n=15)

<i>Age Group</i>	<i>Number of Ill Persons (%)</i>
0-4 years	4 (26.7)
5-10 years	6 (40.0)
10-19 years	2 (13.3)
20+ years	3 (20.0)

Complete clinical information was available for 14 of the 15 ill persons. Fourteen experienced a paroxysmal cough and three reported post-tussive vomiting (Table 3). No hospitalizations were reported.

Table 3: Clinical information for ill persons (n=15)

<i>Symptoms</i>	<i>Ill Persons with Symptoms (%)</i>
Cough	15 (100.0)
Paroxysmal Cough	14 (93.3)
Apnea	7 (46.7)
Inspiratory Whoop	6 (40.0)
Post-tussive Vomiting	3 (20.0)

Vaccination records were available for 13 of 15 ill persons. Nine (69.2%) ill persons had been previously vaccinated against pertussis. Four (30.8%) ill persons were unvaccinated due to religious exemption (Table 4).

Table 4: Number of pertussis-containing vaccines previously received among ill persons (n=13*)

<i>Number of Pertussis-Containing Vaccines Previously Received</i>	<i>Number of Ill Persons (%)</i>
0	4 (30.8)
1	0 (0.0)
2	0 (0.0)
3	1 (7.7)
4	2 (15.4)
5	5 (38.5)
6	1 (7.7)

* Vaccination status unknown for two ill persons

Conclusions

The disease onset of the first ill person was on September 10, 2014. During the course of the outbreak, 15 ill persons with confirmed pertussis were identified among school-aged children, daycare providers and staff, church attendees in Marion County, and community contacts of these persons.

This outbreak included four ill persons that were unvaccinated and religiously exempt. The pertussis vaccine is a safe, effective way to prevent disease. The Advisory Committee for Immunization Practices (ACIP) recommends DTaP at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years as well as a Tdap booster at 11-12 years.¹ The Centers for Disease Control and Prevention (CDC) estimates that at least 9 out of 10 children are fully protected from pertussis when they receive the five recommended doses of DTaP on schedule; vaccination also lowers the likelihood of a severe infection.² There is a modest decrease in vaccine effectiveness in each year following the completion of the five dose series, which may result in previously vaccinated individuals developing pertussis. Approximately seven of ten kids are fully protected five years after getting their last dose of DTaP. For children in middle school one dose of Tdap between the ages of 11 and 12 years old is recommended to account for waning vaccine effectiveness of the DTaP series, which may reduce morbidity and transmission to at-risk populations.^{3,4}

Outbreaks in which transmission is occurring in multiple settings require extensive contact investigations into not only classmates, but also extra-curricular activities, social networks, and

communal gatherings. This outbreak underscores the importance of both immunization and timely reporting and investigation of infectious diseases.

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¹ 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 October 21, 2014, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4913a1.htm>

² Centers for Disease Control and Prevention. Pertussis: Frequently Asked Questions. Accessed October 21, 2014, <http://www.cdc.gov/pertussis/about/faqs.html>

³ 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 October 21, 2014, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5503a1.htm>

⁴ 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 October 21, 2014, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm>