

Outbreak of Measles Associated with International Travel — Butler County, June 2017



Background

On July 29, 2017, the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section (KDHE) was notified by a hospital emergency department of a patient suspected of having measles. KDHE notified the Butler County Health Department (BCHD). The initial investigation revealed the patient was an unvaccinated child who recently returned from a country in Europe that was experiencing a large outbreak of measles. The patient became ill while still in Europe (prior to boarding the return flight home) and was immediately taken to the emergency department upon landing in Kansas.

KDHE also notified the Centers for Disease Control and Prevention (CDC) Emergency Operations Center and their Division of Global Migration and Quarantine to initiate the process of contact investigation on affected airlines. With support from multiple local health departments, KDHE

began an outbreak investigation to identify additional cases and exposed individuals, and to implement prevention and control measures.

Methods

Epidemiologic Investigation

A confirmed measles case was defined as an acute febrile rash illness with detection of measles-virus specific nucleic acid from a clinical specimen using polymerase chain reaction.

Reported cases of measles or their guardians were interviewed to assess symptoms, onset date, transmission setting, and vaccination status. In accordance with Kansas Administrative Regulation (K.A.R.) 28-1-6, each case of measles was isolated for four days after the onset of rash.

A contact was defined as a person who had direct contact with a person infectious with measles or shared the same confined airspace with a person infectious with measles up to two hours after the infectious person left. A susceptible contact was defined as a contact who had not received any doses of measles-containing vaccine, had no history of measles disease, or was born after 1957. Persons born before 1957 are considered likely to have been infected with measles. All identified contacts were assessed for susceptibility and development of symptoms.

Susceptible contacts were to either be vaccinated with the measles, mumps, and rubella vaccine (MMR) within 72 hours of exposure or excluded from school, child care or healthcare for 21 days following the last exposure to an infectious case of measles. Voluntary exclusion for 21 days was requested of susceptible contacts that did not attend/work at a school or daycare, or was not a healthcare worker. Vaccination with MMR for post-exposure prophylaxis is not possible for certain groups of people due to contraindications (e.g., age, medical condition); however, immune globulin (IG) has shown to prevent or modify symptoms of measles if given within six days of exposure. IG was recommended (with consultation of a primary care provider) for high risk susceptible contacts if it had been ≤ 6 days since the last exposure to measles. High risk was defined as:

- infants <12 months,
- pregnant women, and/or
- severely immunocompromised persons.

High risk susceptible contacts that received IG and attended/worked at a school or daycare or were a healthcare worker were excluded for 28 days after receipt of IG. Voluntary exclusion for

28 days was requested of a high risk susceptible contacts that did not attend/work at a school or daycare or were not a healthcare worker.

Identified contacts were followed up for 21 or 28 days (depending on receipt of IG) to assess for development of symptoms that could have been attributable to measles. Multiple mass text messages were sent via Qualtrics, which is an online survey tool, throughout the incubation period to these contacts for assessment. Contacts were requested to reply back via text message as to whether they had or had not developed symptoms:

- Response of “1” correlated to development of symptoms
- Response of “2” correlated to no development of symptoms.

Laboratory Analysis

Specimens from various sources were collected from eighteen persons and submitted for measles testing. Throat swabs, nasopharyngeal swabs, and/or urine was collected from sixteen persons and submitted to the Kansas Health and Environmental Laboratories (KHEL) for testing via polymerase chain reaction (PCR); two of these were forwarded on to CDC for confirmation testing and measles genotyping via PCR. A nasopharyngeal swab or blood was collected from two persons and submitted privately for measles testing via culture or serology (Immunglobulin M [IgM] and Immuglobulin G [IgG]).

Results

Epidemiologic Investigation

Two cases of measles were identified and were classified as confirmed. Both were female; one was a child, and one was an adult. Symptoms reported by both persons included rash and fever (Table 1).

Table 1: Clinical Symptoms Reported Among Ill Persons (n=2)

<i>Symptoms</i>	<i># of Ill Persons/Total</i>	<i>% of Ill Persons</i>
Rash	2/2	100.0%
Fever	2/2	100.0%
Cough	1/2	50.0%
Coryza	1/2	50.0%
Conjunctivitis	1/2	50.0%
Koplick spots	1/2	50.0%

The onset dates of illness were June 25 and July 13, 2017. Vaccination histories were obtained for both ill persons. One was completely unvaccinated, and one had received two doses of measles-containing vaccine; however, this person had an autoimmune disorder.

Contact investigation for the first ill person revealed 55 persons potentially exposed in Kansas or on the flight to Kansas (Table 2); the contacts were residents of Butler, Sedgwick, Harvey, McPherson, and Pawnee counties. Seven contacts were considered susceptible; three family members received MMR within 72 hours of exposure, three emergency waiting room contacts received MMR within 72 hours of exposure, and one susceptible healthcare worker was excluded from work for 21 days following exposure.

Table 1: Number of Contacts by Type for Measles Case #1

Contact Type	# of Contacts Identified	# of Susceptible Contacts	# of Contacts Developed Measles
Family	9	3	0
Hospital	18	4	0
Flight	28	0	1

One of the flight contacts developed measles and represents the second ill person in this outbreak. The second ill person visited 11 public places in Sedgwick County while infectious and contact investigation revealed >400 persons potentially exposed. Due to this large number, a press release was distributed that instructed persons who visited these places on certain dates and times to call KDHE’s Epidemiology Hotline for exposure and susceptibility assessment. KDHE implemented the Incident Command Structure (ICS) when this occurred and the hotline received almost 900 phone calls in a single month. Most places of exposure occurred greater than 72 hours from when the second case was reported, so susceptible persons were outside the timeframe to receive MMR to prevent development of disease. However, all the exposures were within six days, therefore, IG was recommended to 19 infants; seven received IG. Infants that attended daycare and did not receive IG were excluded for 21 days. Those that received IG were excluded from daycare for 28 days. Infants that did not attend daycare were requested to undergo voluntary exclusion from large gatherings for either 21 or 28 days, dependent on IG receipt.

Scheduled mass text messages assessing for development of any symptoms were sent to all identified exposed contacts through the end of their incubation periods. Susceptible contacts received a text message every day and non-susceptible contacts received a text message every three days. Persons who did not respond were followed up with via personal text message or phone call to ensure symptoms had not developed. None of the identified exposed contacts developed measles.

Ten contacts developed non-specific respiratory symptoms within 3-16 days of their possible exposure to the second measles case. Six other persons developed symptoms, but did not have documented exposure to either case of measles. These sixteen persons called KDHE's Epidemiology Hotline to report symptoms. Measles was ruled out as the causative agent of illness in these persons. Two additional flight contacts (one Pennsylvania resident and one New York resident) contracted measles from the first ill person in this outbreak.

Laboratory Analysis

Two of the 18 persons for whom specimens were collected and submitted for testing at KHEL were positive for measles via PCR. These specimens were forwarded to CDC and were confirmed to be measles genotype B3. Measles testing via IgM serology was also conducted on one of these two persons at a private laboratory and tested positive. The remaining 16 persons for whom specimens were collected and submitted for testing at KHEL or a private laboratory tested negative for measles.

Discussion

Two cases of measles were identified during the course of this outbreak. An unvaccinated child contracted measles while in Europe and subsequently infected one person on a flight back to Kansas. In addition, two persons from other states that were exposed on a flight also developed measles.

The incubation period for measles ranges from 7-21 days with an average of 14 days¹. However, even though some contacts developed symptoms earlier than seven days testing was still conducted to rule measles infection out. Persons that did not have any documented exposure were also tested in the event a place of exposure was not identified.

Measles has been eliminated from the United States since 2000 due to a highly effective vaccine and high vaccine coverage among children. CDC estimates that one dose of MMR is 93% effective and two doses are 97% effective at preventing measles². In this outbreak, one ill person was completely unvaccinated and the other was fully vaccinated, but had an immunocompromising condition. Most identified exposed contacts had either previously been vaccinated or had disease, which may have limited the further spread of measles during this outbreak.

A challenge of this investigation was the number of exposed contacts. Exposure to the first ill person occurred on multiple flights back to the United States and in the waiting room and emergency department of a hospital, which involved contact investigations by five local health

departments in Kansas. The second ill person visited numerous public places while infectious that resulted in hundreds of potentially exposed contacts, which involved implementation of ICS by KDHE.

Many efforts were successful during this measles outbreak. Standing up ICS allowed KDHE to develop and maintain the surge capacity to assess for exposure and susceptibility status of exposed contacts. ICS also provided a platform for efficient communication between state and local entities and delivery of consistent prevention recommendations. Another success included the use of mass text messaging to assess for symptom development throughout incubation periods. This was a low cost method that allowed for quick targeted distribution and response to hundreds of identified exposed persons. Lastly, a success was one local health department's capability and willingness to collect specimens from exposed persons suspected of having measles when healthcare providers refused to see them.

KDHE and multiple local health departments were presented with very time- and labor-intensive tasks of controlling a measles outbreak. Rapid and rigorous contact identification and follow-up, in addition to a highly vaccinated exposed population, was successful in stopping the spread of measles.

Report by:

Chelsea Raybern, Kansas Department of Health and Environment

Investigation by:

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/>

Sedgwick County Division of Health
1900 E 9th St.
Wichita, KS 67214
<https://www.sedgwickcounty.org/health/>

Butler County Health Department
206 N Griffith St. #B
El Dorado, KS 67042
<http://www.bucoks.com/260/Health>

Harvey County Health Department

215 S Pine St.

Newton, KS 67114

<https://www.harveycounty.com/departments/health-department.html>

McPherson County Health Department

1001 N Main St.

McPherson, KS 67460

<http://www.mcphersoncountyks.us/15/Health-Department>

Pawnee County Health Department

715 Broadway

Larned, KS 67550

<http://www.pawneecountykansas.com/DEPARTMENTS/HealthDepartment/tabid/6397/Default.aspx>

¹ Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

² Centers for Disease Control and Prevention. Measles (Rubeola): Frequently Asked Questions about Measles in the U.S. Accessed February 19, 2018. <https://www.cdc.gov/measles/about/faqs.html>.