

Notes from the Field

Measles Outbreak of Unknown Source — Shelby County, Tennessee, April–May 2016

Mary-Margaret A. Fill, MD^{1,2}; David Sweat, MPH³; Helen Morrow, MD³; Alisa Haushalter, DNP³; Judy C. Martin, PhD³; Tyler Zerwekh, DrPH³; Tamal Chakraverty, MD³; Jennifer Kmet, MPH³; Kevin Morris, MPH⁵; Kelly Moore, MD²; Marion Kainer, MBBS²; Rendi Murphree, PhD^{2,4}; John R. Dunn, DVM, PhD²; William Schaffner, MD⁶; Timothy F. Jones, MD²

On April 15, 2016, local public health officials in Shelby County, Tennessee, were notified of a positive measles immunoglobulin M (IgM) test for a male aged 18 months (patient A). On April 18, 2016, a second positive measles IgM test was reported for a man aged 50 years (patient B). Both patients had rash onset on April 9, 2016. The Shelby County Health Department initiated an investigation, and confirmatory testing for measles virus on oropharyngeal swabs by polymerase chain reaction (PCR) at CDC was positive for both patients. On April 21, 2016, public health officials were notified of a third suspected measles case in a female aged 7 months (patient C) who had developed a rash on April 14; PCR testing was positive. Genotyping conducted at CDC identified genotype B3 measles virus in all three cases. Genotype B3 is known to be circulating globally and has previously been associated with imported cases in the United States (1).

Repeated, detailed interviews with the three patients or their families did not yield an outbreak source or an epidemiologic link among patients A, B, and C. None of these patients, their families, or close contacts reported any recent international travel or exposure to international travelers. The three patients resided at least 15 miles from one another and were members of three distinct geographic, cultural, and socioeconomic groups. However, given the later timing of symptom onset, there is the possibility that patient C was infected by an unidentified epidemiologic link to patient A or B. By May 7, 2016, an additional four laboratory-confirmed cases of measles were identified in Shelby County; all were epidemiologically linked to patients A, B, or C. Age range for the seven patients was 7 months–50 years (median age = 2 years); three (43%) were infants aged <12 months. Six (86%) patients were unvaccinated, three of whom were eligible for measles vaccine, but had missed opportunities to be vaccinated for various reasons. These included one patient who had moved between health care systems and was not identified as being unvaccinated, one whose initial measles, mumps, and rubella (MMR) vaccine dose had been delayed because of illness, and one whose family reported not vaccinating because of concerns about autism. One patient had received 1 age-appropriate dose of measles-containing vaccine.

As has been documented during previous measles outbreaks, rapid and effective public health response required extensive resources (2). Methods to identify potential contacts included reviewing available public setting patron lists, health care facility patient lists, and appointment records; employee interviews, and reviewing hospital security videos. Interviews identified 25 public locations visited by measles patients during their infectious periods (4 days before through 4 days after rash onset), during which transmission might have occurred. Among these locations, six (24%) were hospitals, 12 (48%) were outpatient clinics, and seven (28%) were public settings not related to health care. Comprehensive contact tracing identified 985 potentially exposed persons; 92 (9%) were close contacts of ill persons, and the remaining 893 (91%) were potentially exposed in health care settings. Persons potentially exposed at public locations (i.e., not health care-related) were not individually identified.

Among the 893 health care setting exposures, 235 (26%) were among health care workers and 658 (74%) were among persons who were not health care workers; 678 (76%) occurred in hospitals and 215 (24%) occurred in outpatient clinics. Approximately 90% of exposed health care workers could not provide documentation of MMR vaccination within 24 hours of public health requests for this information; however, 206 (98%) provided documentation within the required 5 days of exposure, and five (2%) were furloughed while obtaining vaccination records or laboratory confirmation of immunity. The Shelby County Health Department issued quarantine orders to 41 close contacts of patients with subsequent daily active monitoring by public health. Approximately 400 doses of MMR vaccine were administered at public health vaccination clinics and community-located events, and postexposure intramuscular immune globulin was administered within 6 days to 18 infants aged <12 months, none of whom developed measles (3).

This outbreak, with three epidemiologically distinct chains of transmission and no identified common source, highlights the importance of high 2-dose MMR vaccination coverage among vaccine-eligible persons and the need for ongoing, vigilant surveillance for measles virus in the United States (3). Clinical providers and public health officials should maintain a high index of suspicion for measles because delayed recognition and delayed reporting to public health officials can lead to a rapid propagation of cases and difficulty in tracking epidemiologic links during investigations. One patient in this outbreak was admitted to a tertiary care hospital for 72 hours, and although measles IgM testing was ordered, the patient was not placed in

airborne isolation. The provider thought a measles diagnosis was unlikely because no documented measles cases had been reported in Shelby County for >10 years and vaccination rates in the area are generally high (approximately 90%) (4).

As demonstrated in this outbreak, a lack of international travel and absence of recent measles cases in the community can provide false reassurance, and it is important that patients with clinically compatible illness and an uncertain vaccination history be evaluated for measles. This outbreak serves as a reminder that certain communities are susceptible to measles outbreaks; however, risks for these outbreaks can be mitigated through prompt identification of potential cases with early notification of public health officials to suspected cases, rapid public health response, and maintenance of high 2-dose MMR vaccination coverage in the community. In addition, all health care workers born during or after 1957 should receive 2 doses of MMR vaccine and ensure that their immunization records are easily accessible for confirmation (5).

Acknowledgments

Sherry Bates, MBA, Tina McElravey, Elizabeth Hart, Lucreza Williams, MPH, Amy Collier, MCRP, Chaitra Subramanya, MPH, Jared Woo, MPH, Marcha E. Allen-Bradley, MBA, Debra Harris, Shelby County Health Department, Memphis, Tennessee; Julie Shaffner, MS, MPH, Robb Garman, MPH, Vicky Reed, Corinne Davis, MPH, Melissa Fankhauser, MPH, Steffany Cavallo, MPH, 2016 Measles Response Team, Tennessee Department of Health; Division of Viral Diseases, CDC.

¹Epidemic Intelligence Service, CDC; ²Tennessee Department of Health, Division of Communicable and Environmental Diseases and Emergency Preparedness; ³Shelby County Health Department, Memphis, Tennessee; ⁴Office of Public Health Preparedness and Response, Career Epidemiology Field Officer Program, CDC; ⁵West Tennessee Regional Health Department, Jackson, Tennessee; ⁶Vanderbilt University School of Medicine, Department of Health Policy, Nashville, Tennessee.

Corresponding author: Mary-Margaret Fill, mfill@cdc.gov, 615-532-6752.

References

- Rota PA, Brown K, Mankertz A, et al. Global distribution of measles genotypes and measles molecular epidemiology. *J Infect Dis* 2011;204(Suppl 1):S514–23. <http://dx.doi.org/10.1093/infdis/jir118>
- Ortega-Sanchez IR, Vijayraghavan M, Barskey AE, Wallace GS. The economic burden of sixteen measles outbreaks on United States public health departments in 2011. *Vaccine* 2014;32:1311–7. <http://dx.doi.org/10.1016/j.vaccine.2013.10.012>
- McLean HQ, Fiebelkorn AP, Temte JL, Wallace GS. Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2013;62(No. RR-04).
- Tennessee Immunization Program, Tennessee Department of Health. Results of the 2015 immunization status survey of 24-month-old children in Tennessee. Nashville, TN: Tennessee Department of Health; 2015. <https://tn.gov/assets/entities/health/attachments/ImmunizationSurvey2015.pdf>
- Advisory Committee on Immunization Practices. Immunization of healthcare personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2011;60(No. RR-7).