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CDC Health Advisory

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Measles outbreaks in the United States: Public health preparedness, control and response in healthcare settings and the community

A measles outbreak linked to an importation from Switzerland currently is ongoing in Arizona. The first case, with rash onset on February 12, 2008, occurred in an adult visitor from Switzerland who was hospitalized with measles and pneumonia. This hospital admission prompted verification of the measles immune status of approximately 1800 healthcare personnel and vaccination of those without evidence of immunity. Through March 31, 2008, nine confirmed cases have been reported to the Arizona Department of Health Services, and there are two suspected cases (one in a Colorado resident) and hundreds of contacts under investigation. The nine case-patients range in age from 10 months to 50 years. All but one were infected in healthcare settings, one of the five adult case-patients is a healthcare worker, and all cases were unvaccinated at the time of exposure.

In January and February 2008, San Diego experienced an outbreak of 11 measles cases, with an additional case-patient who was exposed in San Diego but became ill in Hawaii. The index case was an unvaccinated child who had recently traveled to Switzerland, where a measles outbreak is ongoing (see <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5708a3.htm>). Transmission in this outbreak occurred in a doctor's office as well as in community settings. Measles genotype D5 was identified from more than one case in the San Diego and Arizona outbreaks; this genotype is currently circulating in Switzerland (see http://www.eurosurveillance.org/edition/v13n08/080221_1.asp). Confirmed measles cases also have been reported from New York City (involving genotype D4, which is identical to the genotype responsible for a large ongoing measles outbreak in Israel; see http://www.eurosurveillance.org/edition/v13n08/080221_3.asp) and from Virginia (importation from India). In addition, two measles cases recently confirmed in unvaccinated siblings from Michigan may have resulted from exposure during a long stop-over in the Atlanta airport.

Although measles is no longer an endemic disease in the United States, it remains endemic in most countries of the world, including some countries in Europe. Large outbreaks currently are occurring in Switzerland and Israel. In the United States from January 1 through March 28, 2008, 24 confirmed cases of measles resulting from importations from endemic countries have been reported to the Centers for Disease Control and Prevention (CDC). These cases highlight the ongoing risk of measles importations, the risk of spread in susceptible populations, and the need for a prompt and appropriate public health response to measles cases. Because of the severity of the disease, people with measles commonly present in physician's offices or emergency rooms and pose a risk of transmission to other patients and healthcare personnel in these and in inpatient hospital settings. Healthcare providers should remain aware that measles cases may occur in their facility and that transmission risks can be minimized by ensuring that all healthcare personnel have evidence of measles immunity and that appropriate infection control practices are followed.

Transmission and case definition

Measles is a highly contagious disease that is transmitted by respiratory droplets and airborne spread. The disease can result in severe complications, including pneumonia and encephalitis. The incubation period for measles ranges from 7 to 18 days. The diagnosis of measles should be considered in any person with a generalized maculopapular rash lasting ≥ 3 days, a temperature $\geq 101^\circ\text{F}$ (38.3°C), and cough, coryza, or conjunctivitis. Immunocompromised patients may not exhibit rash or may exhibit an atypical rash.

Recommendations

Rapid and aggressive public health action is needed in response to measles cases. Case investigation and vaccination of household or other close contacts without evidence of immunity should not be delayed pending the return of laboratory results. Preparation for other control activities may need to be initiated before laboratory results are known. Control activities include isolation of known and suspected case-patients and administration of vaccine (at any interval following exposure) or immune globulin (within 6 days of exposure, particularly contacts ≤ 6 months of age, pregnant women, and immunocompromised people, for whom the risk of complications is highest) to susceptible contacts. For contacts who remain unvaccinated, control activities include exclusion from day care, school, or work and voluntary home quarantine from 7 to 21 days following exposure. Persons who are known contacts of measles patients and who develop fever and/or rash should be considered suspected measles case-patients and be appropriately evaluated by a healthcare provider. If healthcare providers are aware of the need to assess a suspected measles case, they should schedule the patient at the end of the day after other patients have left the office and inform clinics or emergency rooms if they are referring a suspected measles patient for evaluation so that airborne infection control precautions can be implemented prior to their arrival.

Healthcare providers should maintain vigilance for measles importations and have a high index of suspicion for measles in persons with a clinically compatible illness who have traveled abroad or who have been in contact with travelers. They should assess measles immunity in U.S. residents who travel abroad and vaccinate if necessary. Measles outbreaks are ongoing in Switzerland and Israel, and measles outbreaks are common throughout Europe. Measles is endemic in many countries, including popular travel destinations, such as Japan and India. Suspected measles cases should be reported immediately to the local health department, and serologic and virologic specimens (serum and throat or nasopharyngeal swabs) should be obtained for measles virus detection and genotyping. Laboratory testing should be conducted in the most expeditious manner possible.

Preventing transmission in healthcare settings

To prevent transmission of measles in healthcare settings, airborne infection control precautions (available at http://www.cdc.gov/ncidod/dhqp/gl_isolation.html) should be followed stringently. Suspected measles patients (i.e., persons with febrile rash illness) should be removed from emergency department and clinic waiting areas as soon as they are identified, placed in a private room with the door closed, and asked to wear a surgical mask, if tolerated. In hospital settings, patients with suspected measles should be placed immediately in an airborne infection (negative-pressure) isolation room if one is available and, if possible, should not be sent to other parts of the hospital for examination or testing purposes.

All healthcare personnel¹ should have documented evidence of measles immunity on file at their work location. Having high levels of measles immunity among healthcare personnel and such

¹ Healthcare personnel are defined as any persons (i.e., medical or non-medical, paid or volunteer, full- or part-time, student or nonstudent, with or without patient-care responsibilities) who works at a facility that provides health care to patients (i.e., inpatient and outpatient, private and public).

documentation on file minimizes the work needed in response to measles exposures, which cannot be anticipated. Recent measles exposures in hospital settings in three states necessitated verifying records of measles immunity for hundreds or thousands of hospital staff, drawing blood samples for serologic evidence of immunity when documentation was not on file at the work site, and vaccinating personnel without evidence of immunity.

Recommendations for vaccination

Measles is preventable by vaccination. MMR vaccine is routinely recommended for all children at 12–15 months of age, with a second dose recommended at age 4–6 years. Two doses of MMR vaccine are recommended for all school students and for the following groups of persons without evidence of measles immunity²: students in post–high school educational facilities, healthcare personnel, and international travelers who are ≥ 12 months of age. Other adults without evidence of measles immunity should routinely receive one dose of MMR vaccine. To prevent acquiring measles during travel, U.S. residents aged ≥ 6 months traveling abroad should be vaccinated or have documentation of measles immunity before travel. Infants 6–11 months of age should receive one dose of monovalent measles vaccine (or MMR vaccine if monovalent vaccine is not available) prior to travel.

During a measles outbreak, additional vaccine recommendations should be considered: 1) children ≥ 12 months of age should receive their first dose of MMR vaccine as soon after their first birthday as possible and their second dose 4 weeks later, 2) healthcare facilities should strongly consider recommending one dose of MMR vaccine to unvaccinated healthcare personnel born before 1957 who do not have serologic evidence of immunity or physician documentation of measles disease, and 3) one dose of measles or MMR vaccine should be considered for infants ≥ 6 months of age.


Further information on measles and measles vaccine is available at state health departments' websites and at <http://www.cdc.gov/vaccines/vpd-vac/measles/default.htm>.

Additional Sources of Information

The Centers for Disease Control and Prevention maintains a website with many informative articles and references on measles and the MMR vaccine. Several links are listed below.

- CDC. Measles, Mumps, and Rubella—Vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps: recommendations of the Advisory Committee on Immunization Practices (ACIP). [MMWR 1998;4\(No RR-8\):1–57.](#)
- Immunization of Health-Care Workers, Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). [MMWR 1997;46 \(RR-18\):1–42.](#)
- CDC. Outbreak of measles—San Diego, California, January–February 2008. [MMWR 2008;57\(08\):203–6.](#)
- CDC. Multistate measles outbreak associated with an international youth sporting event—Pennsylvania, Michigan, and Texas, August–September 2007. [MMWR 2008;57\(07\):169–73.](#)
- CDC. Progress in reducing global measles deaths, 1999–2004. [MMWR 2006;55\(09\):247–9.](#)
- CDC. Import-associated measles outbreak—Indiana, May–June 2005. [MMWR 2005;54\(42\):1073–5.](#)

² Presumptive evidence of measles immunity includes two doses of MMR vaccine, serologic evidence of immunity to measles, birth before 1957, or physician-diagnosed measles.

- CDC. Preventable measles among U.S. residents, 2001–2004. [MMWR 2005;54\(33\):817–20.](#)
- CDC. Progress in reducing measles mortality—worldwide, 1999–2003. [MMWR 2005;54\(08\):200–3.](#)
- CDC. Brief Report: Imported measles case associated with nonmedical vaccine exemption—Iowa, March 2004. [MMWR 2004;53\(11\):244–6.](#)
- CDC. [Manual for the surveillance of vaccine-preventable diseases.](#)
- [Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007.](#)
- [Measles: General Information](#), provides background and incidence information and links to other information, including laboratory tools.
- MMR [Vaccine Information Statement](#) .
- MMR [Vaccine Questions and Answers](#) for Clinicians.
- [Vaccines and Preventable Diseases: Measles Disease In-Short](#), provides general information about measles, including a description of the disease, information about symptoms, complications, transmission, and the vaccine and who needs it.
- [Vaccines and Preventable Diseases: Measles Vaccination](#), provides general information about the disease, vaccination information, beliefs and concerns, vaccine safety, and who should not be vaccinated. It also contains more specific information for clinicians, including technical information, recommendations, references and resources, provider education, and materials for patients.
- [Travelers' Health](#), including information for specific groups and settings.
- Travelers' Health: [Yellow Book](#), CDC health information for international travel 2008.

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