

Never Seen Measles? 5 Things to Know

Andrew T. Pavia, MD

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Measles Re-emerges

Measles infections in the United States are reaching their highest level in decades, which means that most clinicians practicing in this country today have never actually seen a case of the highly contagious disease. Although measles was declared eliminated from the United States in 2000, 704 cases have been reported from 22 states as of April 26, 2019.^[1] The infection's clinical presentation is fairly typical and predictable, but it can lead to serious complications and may even require hospitalization.

Here are five things to know about measles.

1. Certain Patient Groups Are Most Vulnerable

Before measles vaccination began in the United States in 1963, many children contracted this highly contagious disease and simply suffered through a miserable illness. Almost 500 people died each year from measles, with 1000 cases of encephalitis and 48,000 hospitalizations—in a population one third the current size.^[2] Other complications include otitis media, laryngotracheobronchitis (croup), measles pneumonia, and bacterial pneumonia. Subacute sclerosing panencephalitis is a delayed form of encephalitis that may appear 3-30 years after the infection^[3] and is more common in children infected with measles at a young age.

Malnourished children are particularly vulnerable; diarrhea and pneumonia can be lethal complications, and measles can cause blindness in these children. Vitamin A deficiency increases the risk for severe pneumonia, diarrhea, and eye disease.

Measles is more likely to be [severe and cause complications in the following groups](#):

- Children younger than 5 years of age but especially infants;
- Adults older than 20 years;
- Pregnant women; and
- People with severely compromised immune systems (eg, from cancer chemotherapy, leukemia, transplantation, HIV, or immunosuppressive drugs).

2. People Who Think They Are Immune May Not Be

Natural infection or two doses of MMR vaccine provides durable, generally life-long protection. Two doses of vaccine are 97%-98% effective; one dose is 90%-93% effective. In 1989, the American Academy of Pediatrics (AAP) and the Advisory Committee on Immunization Practices (ACIP) recommended a second dose of MMR vaccine, so most people born after 1988 received two doses of MMR and are immune.^[2]

Most, but not all, adults born before 1957 had measles and are immune. However, the situation may be more complex for people born between about 1957 and 1988. Most schools and many colleges, universities, and professional schools began to require a second dose of MMR for entry in the 1990s, so many people born in the late 1970s and 1980s have had two doses.

A less effective vaccine was used from 1962 to 1967. Some people who received this vaccine are still susceptible to measles. Those who were vaccinated between 1962 and 1989 received only a single dose and therefore may not be fully protected.

If possible, check vaccine records for administration of two doses of vaccine as evidence of immunity. Alternatively, measuring measles IgG titers can demonstrate immunity. Proof of immunity should be documented for all people working in the healthcare field. Given the current outbreak, proof of immunity is wise for people living in or traveling to areas with ongoing measles transmission.

3. The Most Important Diagnostic Tool Is Your H&P

To diagnose measles quickly enough to allow quarantine, contact tracing, vaccination of susceptible contacts, and other public health interventions, you need to recognize and diagnose the disease clinically. This requires a good history and physical exam. Measles is readily recognizable by its clinical features.

History can aid in identifying a patient's susceptibility (eg, vaccination status) and possible exposure to measles, such as travel to areas of ongoing transmission. The [Centers for Disease Control and Prevention \(CDC\) maintains a list of confirmed measles cases and the states in which they occurred, updated weekly](#). A careful history of disease progression and symptoms is critical.

After an incubation period of 8-12 days after exposure, the prodromal symptoms begin with fever, cough, coryza, and conjunctivitis (the "three Cs").^[4,5] During this period, Koplik spots—bluish-white lesions on a red base—may appear on the buccal mucosa, most often opposite the molars.



Figure 1. Koplik spots. Courtesy of CDC.

If present, Koplik spots are virtually pathognomonic. Fever increases over 2-4 days, as high as 104°F, and the patient is usually quite ill-appearing. Photophobia can be prominent.

After 2-4 days, the rash appears on the forehead or back of the head and spreads downward to the trunk and

extremities over the next 3 days.



Figure 2. Measles rash.

The rash is red and maculopapular, often with raised areas. The rash can become confluent on the face or torso before fading in the same head-to-toe pattern. The rash can be harder to recognize in very dark-skinned patients, although it is often obvious to a child's parent. Fever typically peaks 2-3 days after rash onset. Persistent or recurrent fever may signal bacterial infection. The rash may be absent in immunocompromised patients.

People with measles are contagious from the onset of the prodrome until 48 hours after the rash appears.

4. Lab Testing for Measles Takes Time

Lab testing to rule out measles is unlikely to be timely enough to help with measles control. Lab testing is important for confirmation, but the history and clinical features can make a reasonable clinical diagnosis or rule out measles well before lab test results are received. Leukopenia or lymphopenia is typically seen in measles but is not diagnostic. Serology and viral detection are the available tools for confirmation.

Serology is more widely available. IgM antibodies begin to appear 1-2 days after rash onset, although the IgM response can be delayed. About 20% of patients with measles will be IgM negative during the first 74 hours after rash onset; repeat testing should be performed if suspicion for measles remains. IgM assays are not 100% specific, and low-level positives around the cutoff level may represent false positives. Serial testing can resolve this. Thus, depending on lab turnaround, the diagnosis may not be confirmed by serology until 3-6 days after rash onset.

Measles virus can be detected by polymerase chain reaction (PCR), which provides the most definitive confirmation. The throat and nasopharynx are the preferred sites to sample for PCR, and sampling more than one site may increase detection. However, PCR for measles virus is not currently available through commercial labs in the United States.

Measles PCR testing can be arranged through local or state health departments and is performed in conjunction with CDC. The health department will provide guidance on the need for testing and can help with managing quarantines and contact tracing.

Patients with measles are highly contagious. The spread is by true aerosols that can remain suspended in the air and infectious for up to two hours. If they need to go to a lab to have blood drawn, you should notify the lab and infection control to help prevent exposing other patients.

5. MMR Vaccine Doses Can Be Given Earlier

Two doses of MMR vaccine administered after 12 months of age are required for full protection, but children can get the second dose as early as 28 days after the first dose, so it's not necessary to wait until children are 4-5 years of age.

During non-outbreak periods, the recommended schedule for children is to give the first dose at age 12-15 months. The second dose is routinely given before school entry at age 4-6 years. However, the [ACIP](#) makes it clear that during outbreaks or before travel, the second dose can be given as soon as 28 days after the first dose. It will count towards completing immunization requirements in children at least 1 year of age.

For infants aged 6-11 months who are at high risk for exposure to measles, a dose of MMR vaccine can be given. It will provide reasonable short-term protection. However, it's not considered a valid first dose, and another dose must be given after the child's first birthday. In the current outbreak situation, it's wise to consider moving the second dose up for children aged 12 months or older, and to give an early dose to children aged 6-11 months who live in areas where transmission is ongoing or who will be traveling.

References

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