



Measles

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Measles is an acute, highly contagious disease caused by the measles (rubeola) virus and is a major cause of illness and death worldwide. Typical symptoms of the disease include fever, cough, runny nose (coryza), a blotchy red rash, and reddened watery eyes (conjunctivitis). The rash usually begins on the face and then progresses to involve the entire body. After 5 to 6 days, the rash usually fades in the same order of appearance, from face to extremities. Koplik spots, tiny blue-white bumps resembling grains of sand, may arise on the mucous membranes of the mouth. Their presence is strongly suggestive of a diagnosis of measles.

Complications of measles include middle ear infections (otitis media), diarrhea, pneumonia, and inflammation of the brain (encephalitis). Measles during pregnancy increases the probability of spontaneous abortion, premature labor, and low birth-weight infants. In rare circumstances, measles results in a degenerative neurologic illness (subacute sclerosing panencephalitis).

In the USA, 1 to 3 of every 1000 measles cases results in death. Children less than 5 years of age, those with severe malnutrition, and those who are immunocompromised (due to HIV/AIDS or other conditions) are at higher risk.

Prevalence and Distribution

Measles vaccine became available in the USA

in 1963. Prior to the introduction of an effective vaccine, about half a million measles cases were reported nationwide each year. Since widespread vaccination against measles has been in place, the number of cases has declined by 99%. Currently fewer than 200 measles cases are reported in the USA each year, most of which are related to importation of the virus from other countries.

An increase in measles cases occurred from 1989 to 1991, primarily in large urban areas among racial and ethnic minority children younger than 5 years of age who had not been immunized in accordance with national standards. Intensive campaigns to vaccinate pre-school-aged children led to a rapid decline in cases. Outbreaks among school- and college-aged children, related to waning immunity

Measles. Typical facial rash of measles. This child has a fever, cough, runny nose, red and watery eyes, and this blotchy rash that began on his face and then spread to his entire body. Photo courtesy of the CDC



Measles.
Face of child with
measles.
Photo courtesy
of the CDC

or failure to respond to the measles vaccine (primary vaccine failure), have become uncommon since the introduction of a routine two-dose measles vaccination schedule. Prior infection with measles seems to provide lifelong protection against later exposures to the disease.

Transmission

Measles spreads when a person in the infectious stage of the disease disperses droplets carrying the virus into the air by coughing, sneezing, or talking. These droplets land on mucous membranes of other people or are inhaled from the air. Measles virus can last in the air of an enclosed area for up to 2 hours after an infectious person has left the room. The air ventilation system in a building can also disperse the virus from room to room. Measles typically occurs in late winter or spring.

The incubation period for measles is usually 8-12 days after exposure. Rash usually appears 14 days after exposure but can range from 7-18 days. Individuals are infectious from 3-5 days before until 4 days after the rash appears.

Diagnosis

Measles should be suspected in anyone who has the following signs or symptoms:

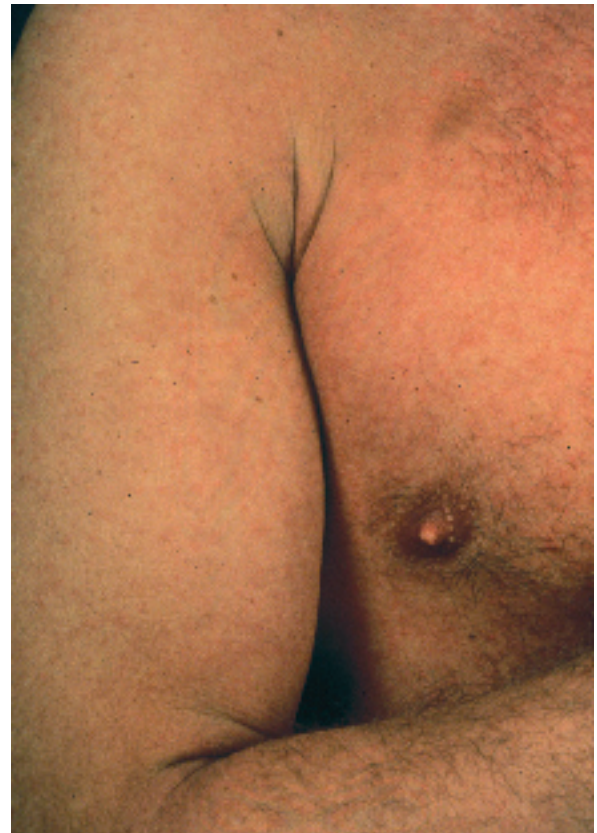
- a generalized rash;
- fever;
- cough, coryza, or conjunctivitis.

The likelihood of measles increases if an individual is not born in the USA, if there have been other measles cases in the area, or if the patient has traveled to other countries or other areas in the USA where a large number of measles cases have been reported.

A blood test (serology) to measure measles IgM antibody is typically used to diagnose measles. This test may not become positive until the rash has been present for 3 days and remains positive for about 1 month. A person who has an illness compatible with measles but has a negative initial IgM test obtained early after the onset of the rash should have the test repeated. In addition, a rubella (German measles) serology should be checked since symptoms of the two infections can appear similar. Other tests used to confirm a diagnosis of measles include viral culture of urine, blood, or nasopharyngeal secretions, and paired tests on blood specimens drawn about 2 weeks apart to look for rising IgG antibody titers.

Treatment and Prevention

Treatment for measles is supportive; no specific medication is used to eradicate the measles virus. Children with measles who are severely malnourished may require vitamin A supplementation. Because there is no effective treatment once the



Measles Rash.
A generalized rash
appears two weeks
after exposure to
measles. This person
is infectious for 3-5
days before until 4
days after the rash
first appears.
Photo by
Irwin Freedberg MD



Child with Measles. This child with measles has the characteristic red blotchy rash on his buttocks and back during the third day of the illness. Photo courtesy of the CDC

disease occurs, prevention is crucial.

The routine childhood immunization schedule in the USA calls for children to receive two doses of MMR (measles, mumps, rubella) vaccine, with the first dose given at 12-15 months of age and the second given at 4-6 years of age. However, the second dose can be administered any time > 4 weeks after the first dose. Any child > 12 months of age whose immunization history is unknown should be offered two doses of MMR vaccine no less than four weeks apart.

Measles was so widespread in the USA until the mid-1950s that adults born prior to 1957 are likely to be immune to measles by virtue of prior infection. However, persons born in 1957 or later should have an assessment to determine if they are immune to measles. Adequate proof of immunity to measles includes written documentation of any one of the following:

- receipt of at least two doses of a measles containing vaccine given after 1/1/68, at least 4 weeks apart and when the individual was at least 12 months of age;
- a history of physician-diagnosed measles;
- laboratory evidence of immunity to measles based on serology (a blood test).

Individuals born after 1956 without documented immunity to measles should be offered two doses of MMR vaccine. Because of the particular

risk for transmission of measles once it occurs in a health care or shelter setting, workers in these settings, regardless of age, should have either documented immunity to measles as above or be offered two doses of MMR vaccine.

Measles vaccine should not be given to the following groups of people due to an increased risk of side effects from the vaccine:

- persons with current severe, febrile illness;
- people who had an immediate, severe allergic reaction to a previous dose of MMR vaccine;
- individuals with a history of anaphylaxis to neomycin or gelatin (vaccine components);
- persons with very low platelet counts;
- immunocompromised individuals as a result of disease (including HIV) or medication (e.g., steroids);
- pregnant women.

Women should be advised to avoid pregnancy for 4 weeks following the receipt of MMR vaccine. MMR is recommended for persons with asymptomatic HIV infection as well as those not severely immunocompromised by HIV. Because of potential interference with response to MMR vaccine, vaccination must be delayed following the receipt of blood or blood products such as immune globulin. The duration of the interval depends on the particular product administered.

Measles immunization can temporarily suppress the response to tuberculin skin testing, and if both TB testing and measles immunization are needed, they should be performed on the same day. If this is not possible, TB testing should be delayed until 4 to 6 weeks after vaccine administration. In general, MMR vaccine is not given to infants less than one year old because adequate antibody responses are not reliably produced.

Control

Suspected or confirmed measles cases should be reported immediately to the local health department. Public health officials can conduct an overall assessment of the risk to others within a shelter or other setting. To reduce the possibility of transmission of infection, people with confirmed or suspected measles who reside in larger shelters should be separated from guests and staff who may not be immune to the disease. If housing with an immune friend or relative is not an option, admission to an acute care facility may have to be considered. Shelters that admit persons for time periods of several weeks or longer should review any available immunization records for those being admitted. Providing MMR vaccine to those without a history of prior adequate vaccination may help to prevent outbreaks that could easily spread within a crowded environment. Those working in a shelter setting should ensure that they are immune to measles.

Post-Exposure Immunization

Susceptible persons exposed to measles may benefit from post-exposure prophylaxis. Two types of preventive treatment are available:

1. a single dose of MMR vaccine, if given within 72 hours of exposure, may prevent disease;
2. immune globulin (IG), given within 6 days of exposure, may prevent or modify the course of disease. IG is usually given to susceptible close contacts of measles cases who are at high risk for complications from measles. These include infants < 1 year of age, pregnant women, and immunocompromised persons. IG is recommended only for those at high risk and not as a general measure for outbreak control. If indicated, IG should be given as soon as possible after exposure to ensure maximum protection.

Summary

Measles is a serious disease caused by the rubeola virus. The most common signs and symptoms are a fever, a rash covering the entire body, red watery eyes (conjunctivitis), cough, and runny nose (coryza). Tiny blue-white bumps resembling grains of sand may be seen inside the mouth.

Measles is highly contagious. It spreads when a person with the disease talks, sneezes, or coughs, releasing infected droplets into the air. The droplets are then inhaled by others and can infect a person through the lining of the mouth, nose, or throat.

Measles can lead to serious complications, including middle ear infections, pneumonia, diarrhea, and inflammation of the brain (encephalitis). Pregnant women infected with measles have a higher risk of spontaneous abortion, premature labor, and low birth-weight infants.

An effective vaccine to protect against measles is available. Unless specifically contraindicated, susceptible persons and those with an unknown vaccine history should receive two doses of vaccine given at least 4 weeks apart.

If a suspected measles case is referred to a health care facility, that facility should be alerted to the possible diagnosis so that appropriate infection control measures can be in place to minimize the risk of spread to others.

Suspected measles cases should be reported immediately to the local health department. Control measures to minimize the spread of disease need to be implemented quickly to be effective.

Measles can spread easily and rapidly within crowded environments, and therefore all shelter staff should ensure that they are immune to measles. ■

References

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