

Measles (Rubeola)

Summary

Measles is an acute viral disease characterized by fever (as high as 105°F), cough, coryza, conjunctivitis and followed by a maculopapular rash. The rash begins in the face and spreads to other parts for the body. The diagnosis should be confirmed by laboratory testing using serology, reverse transcriptase polymerase chain reaction assay (RT-PCR) or culture.

Agent

Measles virus is a single stranded RNA virus that belongs to the family paramyxoviridae

Transmission

Reservoir:

Humans are natural hosts and no know animal reservoirs

Mode of transmission:

Airborne by droplet spread and direct contact with nasal or throat secretions of infected people. Measles is one of the most highly communicable infectious diseases.

Period of communicability:

From 4 days before the onset of rash to four days after rash onset.

Clinical Disease

Incubation period:

Range of 8-12 days (mean: 10 days) from exposure to onset of symptoms. The average interval between the appearance of rash in the index case and subsequent cases is 14 days with a range of 7-21 days.

Illness:

Measles is an acute disease with prodromal fever, conjunctivitis, coryza, and cough. A characteristic rash usually appears about the fourteenth day after exposure. The rash typically begins behind the ears and on the forehead, and then spreads centrifugally from the head to the feet; however, atypical rash presentations occur as well. The rash is initially erythematous and maculopapular but becomes confluent as the rash spreads. Koplik spots, which are small spots with white or bluish-white centers on the buccal mucosa, can be present. Leukopenia is common. The disease is more severe among infants and adults. Complications include otitis media, pneumonia, croup, and encephalitis.

Laboratory Diagnosis

Diagnostic testing for measles should include serologic, molecular and virologic testing.

The detection of measles-specific IgM antibodies, viral presence in a nasopharyngeal swab by RT-PCR, or a significant rise in measles-specific IgG antibody concentration between acute and convalescent sera establishes the diagnosis.

Virus can be isolated in cell culture from blood or nasopharyngeal swab collected before the fourth day of rash, or urine specimens obtained before the eighth day of rash.

Because measles is rare in the US, the diagnosis should be confirmed by laboratory testing.

Treatment

No specific antiretroviral therapy is available for measles. However, Ribavirin has been used to treat severely ill and immunosuppressed children by intravenous and aerosol routes.

Vitamin A administration is recommended for children diagnosed with measles where vitamin A deficiency is a recognized problem.

Surveillance

Case Definition:

Clinical case definition

A generalized rash lasting greater than or equal to three days, and a temperature greater than or equal to 101.0°F (greater than or equal to 38.3°C), and cough, coryza, or conjunctivitis.

Laboratory criteria

- Positive serologic test for measles-specific IgM antibody; or
- Significant rise in measles-specific IgG antibody level by any evaluated and validated serologic assay; or
- Isolation of measles virus from a clinical specimen; or
- Positive RT-PCR from a clinical specimen.

Confirmed – An illness that meets clinical criteria with:

- Confirmed laboratory criteria; or
- Direct epidemiologic linkage to a case confirmed by one of the laboratory methods above

Probable -- An illness that meets clinical criteria with:

- No epidemiologic linkage to a laboratory-confirmed measles case; and
- Noncontributory or no measles laboratory testing

Suspect – Any febrile illness accompanied by rash

Epidemiologic Classification of Internationally-Imported and US-Acquired Cases

Internationally-Imported Case:

An internationally imported case is defined as a case in which measles results from exposure to measles virus outside the United States (US) as evidenced by at least some of the exposure period (7–21 days before rash onset) occurring outside the US and rash onset occurring within 21 days of entering the US and there is no known exposure to measles in the US during that time. All other cases are considered US-acquired.

US-Acquired Case:

A US-acquired case is defined as a case in which the patient had not been outside the US during the 21 days before rash onset or was known to have been exposed to measles within the US.

Reporting:

Report all suspected or confirmed cases of measles immediately (24/7/365) to the Epidemiology and Response Division (ERD) at 505-827-0006. Information needed includes: patient's name, age, sex, race, ethnicity, home address, home phone number, occupation, and health care provider.

Case Investigation:

Complete the CDC Measles Surveillance Worksheet and mail to the Epidemiology and Response Division, P.O. Box 26110, Santa Fe, New Mexico 87502-6110, or fax to 505-827-0013. Investigation information should also be entered in NM-EDSS per established procedures.

Control Measures

1. Case management

1.1. Isolation: Persons with measles should be excluded from work, school, or child care for four days after rash develops.

1.1.a In hospitals and institutions, patients should be placed in airborne precautions from onset of catarrhal stage of the prodromal period through the fourth day of rash.

1.2. Prophylaxis: Not applicable.

2. Contact management

2.1. Evidence of measles immunity: Persons can be considered immune to measles if they: 1) were born before 1957; 2) have documentation of physician-diagnosed measles; 3) have laboratory evidence of immunity to measles; or 4) have documentation of adequate measles vaccination. One dose of MMR vaccine, or other presumptive immunity, is sufficient for most adults born on or after 1957. Adequate vaccination for preschool-aged children (12 months of age and older) is one dose of measles/mumps/rubella (MMR) (see section 3.1 below). For school-aged children, adolescents and adults, two doses of MMR are recommended.

2.1.a Some adults may have received a killed measles vaccine during 1963 to 1968. People vaccinated during those years are not considered to have adequate immunization and the recommendation is for them to be re-vaccinated.

2.1.b Certain adults are considered to be high risk and need two doses of MMR, administered at least 28 days apart, unless they are considered immune based on the criteria listed above. These adults include: 1) students at post-high school education institutions; 2) healthcare personnel; 3) international travelers.

2.1.c During an outbreak, a second dose of MMR should be considered for children aged 1 through 4 years or adults who have only received 1 dose. If the outbreak involves infants aged <12 months with ongoing risk of exposure, infants aged ≥6 months can be vaccinated.

2.2. Isolation: Exposed susceptible persons (those who cannot demonstrate adequate immunity as listed above), including those who have been exempted from measles vaccination, if not immunized within 72 hours of exposure, should be excluded from work, school, child care, or any other group activities until at least 21 days after the onset of rash in the last case of measles.

2.3. Prophylaxis:

2.3.a Live virus measles vaccine, if given within 72 hours of measles exposure, may prevent disease in susceptible persons. If the exposure dose does not result in infection, the vaccine should induce protection against subsequent measles exposures. Vaccine is the intervention of choice for control of measles outbreaks in schools and child care centers.

2.3.b Immune globulin (IG) for post-exposure prophylaxis can be used within six days of exposure for susceptible household or other contacts, particularly in whom the risk of complications is very high (such as pregnant women, immunocompromised persons, and those under one year of age). The usual dose is 0.25 mL/kg of body weight given

intramuscularly. Immunocompromised persons should receive 0.5 mL/kg (max dose in either instance is 15 mL). IG is not indicated for household contacts who have received one dose of vaccine at 12 months of age or older unless they are immunocompromised.

3. Prevention

3.1. Immunization:

3.1.a A single dose of live, attenuated measles virus vaccine elicits a significant antibody response in 95% of susceptible persons at 12 months of age and 98% at 15 months of age. Measles vaccine is to be administered as a component of the MMR or measles/mumps/rubella/varicella (MMRV) vaccine when a child is 12-15 months of age and at school entry at 4-6 years.

3.1.b Special emphasis must continue to be placed on the immunization of susceptible adolescents and young adults in high school, college, and health care settings.

Management of Measles in Child Care Centers

- Contact the Epidemiology and Response Division (ERD) immediately for any suspected or confirmed case of measles in a school or child care center.
- Children with measles should be kept out of school or child care for four days after rash develops.
- Immunization records of all child care attendees and staff should be reviewed. Refer to section 2.1 above for definition of immunity to measles. Exposed susceptible persons, including those who have been exempted from measles vaccination, if not immunized within 72 hours of exposure, should be excluded from the child care facility until at least 21 days after the onset of rash in the last case of measles.

References

American Academy of Pediatrics. In: Kimberlin, DW, et al eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics; 2018.

Heymann D, ed. Control of Communicable Diseases Manual. 19th ed. Washington, DC: American Public Health Association; 2008.

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, eds. 12th ed., second printing. Washington DC: Public Health Foundation, 2012.

See Measles Fact Sheets ([English](#)) ([Spanish](#)).