

Measles (Rubeola)

Important Notice:

All public health recommendations for routine investigations are based on the “Control of Communicable Diseases Manual, 20th edition, 2015” (CCDM) unless otherwise stated. Use the CCDM as the primary resource for case investigations that require routine follow up. In cases of complicated situations or unique issues not addressed by this manual, please refer to the Administrative Rules of Montana (ARM) Chapter [37.114](#) or contact the designated SME at the Communicable Disease Epidemiology section at the Montana Department of Public Health and Human Services (DPHHS) for further clarification.

PROTOCOL CHECKLIST

- Upon receipt of report communicate with reporting entity and use *Measles (Rubeola) Suspicion Checklist* to gather information to support reported case and compare with Case Definition (see SharePoint → CDEpi → CDEpi Technical Guidance [Diseases A to Z] → Measles → Guidance Documents)
- Confer with Communicable Disease Epidemiology staff by calling 406-444-0273 to determine need for testing and course of further action.
- Review background information on the disease and its epidemiology (see section 2/CCDM/and as a primary resource the Manual for the Surveillance of Vaccine-Preventable Diseases Chapter 7: Measles <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html>)
- Contact provider/facility/local laboratory as indicated to facilitate testing and submission to Montana Public Health Laboratory (MTPHL) per laboratory testing instructions in technical assistance guidance documents.
- Review for use, specific technical assistance guidance documents (see SharePoint → CDEpi → CDEpi Technical Guidance [Diseases A to Z] → Measles → Guidance Documents)
- Prioritize reported cases for follow up, investigate and interview as indicated (see section 1)
- Retrieve disease specific form per the Montana Communicable Disease Reporting Reference for Local Public Health Jurisdictions (see SharePoint → CDEpi → CDEpi Disease Forms)
- Interview patient/parent, cover the following:
 - Review disease facts with patient (see section 2.2)
 - Educate on prevention (see section 6)
 - Ask about exposures/relevant risk factors and identify any contacts (see section 4.3 and 4.4)
 - Implement Control Measures (see section 5.1)
- Confirm diagnosis, see case definition (see section 3) and contact Communicable Disease Epidemiology staff by calling 406-444-0273
- Enter available information into the Montana Infectious Disease Information System (MIDIS) within the time frame for the specific disease per ARM [37.114.204](#) (see section 1.3) Follow-up on special situations, including outbreaks or infected persons in sensitive situations (see section 5 and CCDM, review references and additional information and contact CDEpi at 406-444-0273)
- Enter additional data obtained from interview into MIDIS (fax completed form to DPHHS if indicated on the CD Reporting Reference form) and attach any additional lab reports to case investigation (a step in MIDIS)
- When done with investigation, close case in MIDIS

1 DISEASE REPORTING

1.1 Provider notification to Public Health Authorities

Any person, including, but not limited to a physician, dentist, nurse, medical examiner, other health care practitioner, administrator of a health care facility or laboratory, public or private school administrator, or laboratory professional who knows or has reason to believe that a case exists of a reportable disease or condition defined in the Administrative Rules of Montana (ARM) [37.114.203](#) must immediately report to the local health officer.

1.2 Local Health Department Follow-up Responsibilities

Immediately after being notified of a case or a potential outbreak of a reportable condition, a local health officer must investigate and implement control measures as indicated by CCDM to prevent or control the transmission of disease per ARM [37.114.314](#).

1.3 Local Health Department Reporting to State Public Health Authorities

Measles (Rubeola) must be reported to DPHHS within 24 hours per ARM [37.114.204](#). The disease specific form does need to be submitted to DPHHS as part of the disease investigation process.

2 THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Public Health Significance in Montana

Montana has not had a case of measles reported since 1990. The highly contagious nature of the disease and the short period of time to notify contacts to provide post-exposure prophylaxis (within six days) if necessary, provide a narrow window of opportunity to implement control measures. Early detection of cases is critical for the prevention of outbreaks.

2.2 Clinical Description of Illness

Refer to CCDM (pg. 389 20th Edition) for relevant disease information and its epidemiology.

3 CASE DEFINITION

3.1 Clinical Description

An acute illness characterized by:

- Generalized, maculopapular rash lasting ≥ 3 days; **and**
- Temperature $\geq 101^{\circ}\text{F}$ or 38.3°C ; **and**
- Cough, coryza, or conjunctivitis.

Measles is an acute viral illness characterized by a generalized maculopapular rash,

fever, and one or more of the following: cough, coryza, or conjunctivitis.

Measles has a distinct prodrome lasting 2–4 days before the onset of rash, with a range of 1-7 days, that begins with fever and malaise followed by conjunctivitis, coryza (sneezing, nasal congestion, and nasal discharge), cough, photophobia, and/or Koplik's spots (which are pathognomonic but uncommonly observed). These spots are seen as bluish-white specks on a rose-red background appearing on the buccal mucosa.

The rash is characteristically descending and begins on the head often along the hairline, followed by the upper neck, and spreads downward reaching the hands and feet over a 3 day span. The rash usually lasts 5-6 days and fades in the order it appeared.

Complications of measles include otitis media (7%), pneumonia (6%), and encephalitis (0.1%). Death occurred in 0.3% of cases in the United States with 19% requiring hospitalization. Children less than 5 years of age and adults over 20 most commonly develop complications of measles.

3.2 Laboratory Criteria for Diagnosis

A case is considered to be laboratory confirmed if it is positive for measles upon PCR or viral culture or it is positive for IgM† antibodies.

† False-positive measles IgM tests are more likely to occur when:

- IgM test was not EIA,
- Case did not meet clinical criteria, or
- Case is an isolated indigenous case with no history of travel or visitors from an area of concern
- Measles IgG was detected within seven days of rash onset.

*Serologic testing alone should be used with caution and knowledge of the testing being utilized. CDC guidance for use of serologic testing to support a measles diagnosis (Chapter 22 Pg. 16 Laboratory Support for the Surveillance of Vaccine-Preventable Diseases can be found at <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt22-lab-support.pdf>)

3.3 Case Classification

Probable

In the absence of a more likely diagnosis, an illness that meets the clinical description with:

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

Confirmed

An acute febrile rash illness† with:

- Isolation of measles virus‡ from a clinical specimen; or
- Detection of measles-virus specific nucleic acid‡ from a clinical specimen using polymerase chain reaction; or
- IgG seroconversion‡ or a significant rise in measles immunoglobulin G antibody‡ using any evaluated and validated method; or

- A positive serologic test for measles immunoglobulin M antibody[†]; or
- Direct epidemiologic linkage to a case confirmed by one of the methods above.

[†] Temperature does not need to reach $\geq 101^{\circ}\text{F}/38.3^{\circ}\text{C}$ and rash does not need to last ≥ 3 days.

[‡] Not explained by MMR vaccination during the previous 6-45 days.

[§] Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

4 CASE INVESTIGATION

In accordance with ARM [37.114.314](#) conduct an epidemiologic investigation to determine the source and possible transmission of infection. Refer to the CCDM regarding additional aspects related to investigation. ***Case Investigation should begin as soon as a case is suspected AND a determination to submit a specimen for testing is made.***

4.1 Confirm the Diagnosis

Review the clinical presentation and laboratory results to confirm the diagnosis. Consult the case definition in Section 3.

4.2 Laboratory Requirements

(see SharePoint → CDEpi → CDEpi Technical Guidance [Diseases A to Z] → Measles → Guidance Documents)

For more information on analysis and specimen collection please contact the laboratory conducting the test or the Montana Public Health Laboratory (MTPHL) at 1-800-821-7284. The MTPHL Laboratory Services Manual can be accessed

<http://dphhs.mt.gov/publichealth/LaboratoryServices/PublicHealthLabTesting>

4.3 Case Investigation

- Contact the medical provider who ordered testing or is attending the case. Utilize the case reporting form to assist in obtaining all of the information necessary to complete a measles case report as outlined in ARM [37.114.205](#) regarding report contents.
 - Contact and interview the patient/parent to determine source, risk factors and transmission settings per the measles checklist (see SharePoint → CDEpi → CDEpi Technical Guidance [Diseases A to Z] → Measles → Guidance Documents).
1. Through a credible immunization registry or medical record, obtain measles vaccine history, including: dates of vaccination, type, manufacturer, lot numbers, number of doses after 1st birthday or why not vaccinated.
 2. Interview the case to determine source, risk factors and transmission settings. Focus on the 7-18 days prior to rash onset.
 - a. History of possible exposure(s):
 - b. Any visits to a doctor's office, clinic, or hospital (exact date and time)

- c. Any indoor group activities attended: church, theater, tourist locations or airports, air travel, parties, athletic events, family gatherings, etc.
 - d. Travel history of case, with dates of exit from and reentry to Montana.
 - e. Include dates of travel to other counties in the travel history.
 - Examine if any of the case's household/close contacts or guests during the incubation period had any travel 3 weeks prior to the case's rash onset.
 - f. Examine exposure to others with extended measles-like illness.
 - Obtain dates of exposure,
 - Name and the date of birth of possible sources,
 - The possible source's relationship to case,
 - Transmission setting, if applicable (i.e., household, school, daycare)
 - g. Collect information from case for the contact investigation. (See below).
 - h. Schedule a time for a follow-up interview.
3. Investigate epi-links among cases (clusters, household, co-workers, etc.).
 - If the case had contact with person(s) who have/had measles, determine if the other "cases" have been reported to the state

4.4 Contact Investigation

(Goal: To rapidly identify primary contacts, evaluate immunity status, and provide prophylaxis to susceptible persons within 24 hours of the initial report)

Contact follow-up should be coordinated with DPHHS CDEpi. Contact 406-444-0273

1. Identify and record all of the case's occupations and activities while infectious (four days before rash onset through four days after rash onset).
2. Identify all possible transmission settings (e.g., work, daycare, provider waiting room, school etc.).
3. Prepare a contact list for each possible transmission setting prioritizing high risk contacts.
4. Assess each contact's potential risk based upon age, immunity status (a verbal history of immunization is NOT representative of presumptive immunity) and other epidemiological elements associated with transmission. A documented history of vaccination must be obtained.
5. Assess contacts for symptoms and treat all symptomatic contacts as suspect cases

4.5 Outbreak Considerations

A single case of measles is considered a potential outbreak situation and requires prompt investigation and implementation of control measures to reduce the disease occurrence and the magnitude of the outbreak. Epi-teams, including active surveillance partners, should be stood up upon confirmation of a single case. Risk communications should be prepared when testing for measles is indicated and be initiated immediately upon confirmation of a case. Community-wide vaccination efforts should be initiated as soon as possible. Consultation with CDEpi is recommended.

Do not delay response pending laboratory results. The main strategy for controlling a measles outbreak is to (1) define the at-risk population(s) and the potential transmission setting(s) based on known vaccination coverage; (2) rapidly identify and vaccinate persons without presumptive evidence of immunity or, if a contraindication exists, provide IG to those most at risk of severe

complications from acquired measles; and (3) exclude persons without presumptive evidence of immunity from the setting(s) to prevent their potential exposure to measles and/or the further transmission of measles.

5 CONTROL MEASURES

In accordance with ARM [37.114.501](#), utilize the control measures indicated in the CCDM for this disease. Contact DPHHS CDEpi for consultation and questions at 406-444-0273.

5.1 Case Management

1. In addition to standard precautions, hospitalized patients should be cared for using airborne precautions until 4 days have passed since the onset of the rash (or for the duration of illness if the patient is immunocompromised).
2. Persons **suspected** to have measles must be instructed to do the following during the contagious period (until 4 days have passed since the onset of the rash or for the duration of illness if the patient is immunocompromised):
 - stay home (do not go to child care, school, work, public places or social activities);
 - prohibit contact with susceptible children (particularly infants), susceptible pregnant women, and immunosuppressed individuals;
 - avoid contact with susceptible family members and visitors; and
 - avoid exposing other people at healthcare facilities by calling ahead and making special arrangements to prevent contact with others.

5.2 Environmental Measures

Conduct an environmental evaluation if an ongoing source of exposure is suspected. Waiting rooms and examination rooms should be closed for two hours and be cleaned prior to re-use.

5.3 Special Circumstances

The need for quarantine (most commonly voluntary quarantine) should be evaluated when unvaccinated or populations at high risk are affected. In such situations, quarantine has helped to contain the spread of the disease to the surrounding community. Compliance with quarantine can be ensured with appropriate orders at the discretion of the health department. When deciding about quarantine, factors to consider include:

- immune status of the individual,
- presumptive evidence of immunity,
- whether the person is at high risk or not, and
- transmission settings.

Consult with Communicable Disease Epidemiology staff by calling 406-444-0273.

6 ROUTINE PREVENTION

6.1 Immunization Recommendations

(see SharePoint → CDEpi → CDEpi Technical Guidance [Diseases A to Z] → Measles → Guidance Documents)

6.2 Prevention Recommendations

Vaccination is the best way to prevent measles. One dose of measles-containing vaccine (MMR) is 93% effective at preventing measles if exposed to the virus, and two doses are 97% effective.

7 Escalation/Activation of Emergency Operational Planning

Investigation guidelines are designed to assist local health jurisdictions in the steps and actions needed to report, investigate and control reported cases of communicable diseases. In the event individual case investigations or other reported cases lead to clusters and/or outbreaks, or investigations outside of a local health jurisdiction, local health jurisdictions need to contact DPHHS under the Administrative Rules of Montana [37.114.314](#) and [37.114.315](#) so DPHHS can consider emergency operational escalation or activation under the Communicable Disease Annex to the DPHHS Emergency Operation Plan.

8 REFERENCES AND ADDITIONAL INFORMATION

Important references:

- A. "Control of Communicable Diseases Manual, 20th edition, 2014" (CCDM) American Public Health Association <https://secure.apha.org/imis/ItemDetail?iProductCode=978-087553-0185&CATEGORY=BK>
- B. Manual for the Surveillance of Vaccine-Preventable Diseases Chapter 7: "Measles" (July 2013): Centers for Disease Control and Prevention, Atlanta, GA, 2008. <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html>
- C. Manual for the Surveillance of Vaccine-Preventable Diseases Chapter 22 "Laboratory Support": Laboratory Support for Surveillance of Vaccine-Preventable Diseases (December 2012): Centers for Disease Control and Prevention, Atlanta, GA, 2008. <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt22-lab-support.html>