Measles Investigative Guidelines
July 2026

REPORT IMMEDIATELY

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. To identify measles cases.
2. To prevent or mitigate the spread of measles.
3. To identify groups of unimmunized children and adults.

1.2 Laboratory and Physician Reporting Requirements

Physicians are required to report all cases (including suspected cases) immediately. Labs are required to report all measles-specific positive tests (e.g., PCR, IgM, virus isolation) immediately, day or night. According to OAR 333-018-0018, **measles-positive PCR specimens must be sent to the Oregon State Public Health Laboratory (OSPHL) for additional characterization.** Positive IgM samples must be forwarded to OSPHL upon request of public health.

1.3 Local Public Health Authority Reporting and Follow-Up Responsibilities

1. Report all cases to the Acute and Communicable Disease Prevention Program immediately, day or night.
2. Request testing approval at OSPHL for all probable cases with a clinical presentation compatible with measles.
3. Begin follow-up investigation of confirmed cases within 24 hours. Identify contacts during the period of communicability. Determine if the case visited high risk indoor settings (i.e., health care facilities, schools, day care centers) during the period of communicability and, if necessary, collaborate with OHA to issue public exposure notifications.
4. Identify and exclude susceptible people (e.g., unimmunized children or staff) when measles has been identified in a school, childcare facility, or healthcare setting.

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2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

The measles virus—a single-stranded, RNA-encoded paramyxovirus.

2.2 Description of Illness

Measles is characterized by a febrile prodrome with cough, coryza, and conjunctivitis followed by a distinct maculopapular rash which erupts on the head or neck and spreads cephalocaudally.

The measles prodrome typically begins with mild fever and malaise. Typically, within 24 hours there is the onset of cough, coryza (runny or stuffy nose), and conjunctivitis which may be accompanied by photophobia. Occipital, posterior auricular, and cervical lymphadenopathy may be present. Koplik spots, a viral enanthem described bright red spots with a white center on the buccal mucosa opposite the molars, may be present but are not invariably so. Similarly, not all cases develop cough, coryza, and conjunctivitis, but at least one of these symptoms should be present.

The rash begins as faint macules on the head and neck. The rash typically appears 3–5 days (range: 1–7 days) after the prodrome begins. The fever typically increases as the rash appears, and the fever may exceed 40°C (104°F). The rash becomes more papular (i.e., raised) as it spreads cephalocaudally to affect the trunk and extremities and individual lesions may coalesce. The palms and soles may be affected. Fever typically resolves within 2–3 days of rash eruption; persistent fever beyond this period suggests that a complication of measles (e.g., otitis media) has occurred.

A clinical algorithm for suspect measles cases is available to assist clinicians in diagnosing measles.

2.3 Reservoir

Other acutely infected humans.

2.4 Modes of Transmission

Measles is spread directly from person to person by inhalation of droplets or aerosolized droplets, or by contact with objects contaminated with

secretions. The measles virus is labile—half the infectivity is lost every 2 hours at 37 °C. It does not survive drying on surfaces. Measles is highly contagious, with > 90% attack rates among susceptible close contacts.

2.5 Incubation Period

The average incubation period for measles is 11–12 days (range: 7–21 days), and the average interval between exposure and rash onset is 14 days. The administration of immune globulin early in the incubation period may extend this period to 28 days.

2.6 Period of Communicability

Persons infected with measles are infectious for 4 days before rash onset through 4 days after rash onset. This period may be longer in immunocompromised persons.

2.7 Treatment

There is no specific antiviral treatment for measles. Vitamin A treatment has been associated with reduced morbidity and mortality in limited resource settings in which measles is endemic. Low serum levels of vitamin A have been observed in children with measles in the United States. The WHO recommends vitamin A for all children with measles, regardless of hospitalization status, and many experts in the United States agree with this approach. For guidance regarding vitamin A dosing, see the American Academy of Pediatrics Red Book Measles chapter.

3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

3.1 Clinical Description

The clinical description and case definitions below are aligned with the National Notifiable Diseases Surveillance System (NNDSS) Measles/Rubeola 2013 Case Definition. These surveillance case definitions allow public health to uniformly describe measles activity across jurisdictions. The clinical description is non-specific for measles infection and should not be used for clinical evaluation purposes:

- An acute illness characterized by:
  - Generalized, maculopapular rash lasting ≥3 days; and
  - Temperature ≥101°F or 38.3°C; and
  - Cough, coryza, or conjunctivitis

3.2 Confirmed Case Definition

- An acute febrile rash illness[1] with:
  - Isolation of measles virus[2] from a clinical specimen; or
  - Detection of measles virus-specific nucleic acid[2] from a clinical specimen using polymerase chain reaction; or
  - IgG seroconversion[2] or a significant rise in measles immunoglobulin G antibody[2] using any evaluated and validated method; or
  - A positive serologic test for measles immunoglobulin M antibody[2] [3]; or
  - Direct epidemiologic linkage to a case confirmed by one of the methods above.

3.3 Probable Case Definition

- **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.

3.4 Evaluation of Individuals with Recent Vaccination

Fever following the MMR vaccine occurs in up to 15% of vaccine recipients, typically 5–12 days later. The fever typically persists 1–2 days, but may last up to 5 days. Most individuals who develop fever do not develop other symptoms. A transient measles-like rash occurs in up to 5% of vaccine recipients. Vaccine reactions can be distinguished from wild-type measles infection through a genotype assay available through the CDC. This assay should be offered to individuals who develop measles-like illness within 21 days of vaccination and who are also known to have been exposed to measles. This test must be conducted in parallel with measles PCR testing.

Individuals vaccinated in the previous 45 days who are not known to have been exposed to measles, are presumed to be vaccine-associated cases.

3.5 Testing at the Oregon State Public Health Laboratory (OSPHL)

OSPHL performs RT-PCR for suspect cases of measles. Serology for measles is not available at OSPHL.

All specimens submitted for measles PCR testing at OSPHL must be coordinated with and approved by ACDP.

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[1] Temperature does not need to reach ≥101°F (38.3°C), and rash does not need to last ≥3 days.
[2] Not explained by MMR vaccination during the previous 6–45 days.
[3] Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

Whom to Test

It is important to restrict testing to those patients most likely to have measles (i.e., those with measles-like illness, especially if they have risk factors for measles, such as being unvaccinated, recent exposure to an area where measles is circulating, or no alternate explanation for symptoms).

Specimen Collection

If measles is considered a real possibility:

- Contact ACDP epidemiologists for approval to test specimens using PCR at OSPHL. ACDP will notify OSPHL of approval. Tests for measles can also be ordered from most commercial laboratories; however, turn-around time may be lengthy.
- After the request has been approved, refer to the OSPHL Lab Test Menu (www.healthoregon.org/labtests) for all specific instructions to collect, store, and transport PCR specimens properly.
- Collect specimens as soon as possible after rash onset in order of preference:
    1. Nasopharyngeal (NP) or oropharyngeal (OP) swab for measles RT-PCR: this is the preferred test for acute measles infection. Swabs should be collected within 5 days of rash onset. After 5 days, NP or OP swabs should be accompanied by urine.
    2. Urine for measles PCR: urine PCR is most sensitive 3–10 days following rash onset. To improve sensitivity, urine should always be collected in addition to NP or OP swabs for vaccinated individuals.
    3. Serum for measles IgM and IgG: measles IgM may not be positive until 3 days after rash onset and typically remains positive until 30 days after rash onset. False positive results may occur. IgG testing is rarely indicated.

Testing for all suspect measles cases should ideally include both PCR and measles-specific IgM antibody testing to optimize testing sensitivity.

Specimens for PCR testing must be accompanied by a completed OSPHL Virology/Immunology Test Request Form, available at www.bitly.com/phl-forms.

The laboratory diagnosis of measles is most often made by detection of measles RNA by RT-PCR. A negative PCR does not rule out measles because test

sensitivity is dependent on the timing of specimen collection and the quality of specimen collection. Test sensitivity is highest when specimens are collected within 3 days of rash onset.

The diagnosis can also be made by detection of measles IgM antibody in a single serum specimen. In most instances, a serum sample should be collected for measles IgM at the first clinical encounter. However, 30% of serum samples obtained in the first 3 days after rash onset are false negatives. These negative results should be confirmed with a second serum obtained >3 days after rash onset. IgM is detectable for at least 30 days after rash onset. A negative IgM does not rule out measles in vaccinated individuals.

False-positive IgM results for measles may occur due to rheumatoid factor or cross-reactivity with other viruses which cause febrile rashes including parvovirus B19, enteroviruses and human herpesvirus-6. These viruses are typically easily distinguished from measles through clinical history and examination.

Because IgG confirmation requires two specimens, and because a confirmed diagnosis cannot be made until the second specimen is obtained, IgM tests are generally preferred. However, if IgM results remain inconclusive, a second convalescent IgG serum specimen, collected 14–30 days after the first acute specimen, can test for an increase in the IgG titer.

4. ROUTINE CASE INVESTIGATION

4.1 Identify the Source of Infection

Measles is circulating in Oregon making it difficult to identify the source of infection for most sporadic cases. Epidemiologically linked cases should be documented in Orpheus.

4.2 Identify Exposed Persons (Contacts)

Identify persons exposed to the case during the period from 4 days before through 4 days after rash onset.

Measles is potentially transmissible after only brief exposure and at significant distances. The virus can remain suspended in air for 2 hours.

An “exposure” to measles is defined as spending any amount of time while unprotected (i.e., without recommended respiratory protection):

- In a shared air space with an infectious measles case at the same time, or
- In a shared air space vacated by an infectious measles case for up to 2 hours.

For all public notifications, the exposure definition above should be used.

For case investigation, investigators should prioritize identifying contacts who have spent time in a shared air space within 10 meters of an infectious measles case and within 20 minutes of the case having been there ("the 10 + 20 rule") as these individuals are at highest risk for transmission. Priority groups for contact investigation include individuals in health care settings, schools, child-care centers, colleges, churches, or other congregate settings because of high contact rates and transmission potential. Those at greatest risk for severe disease are immunocompromised individuals and unvaccinated infants and pregnant women.

A more aggressive definition may be called for in some circumstances—e.g., a case who is coughing vigorously, or a case in an under-immunized population or in a school with high exemption rates. Conversely, cases are less contagious after the rash appears, and if source control (i.e., masking) is used by the case. In a hospital setting, hospital infection prevention and control programs may also elect a broader time interval to define measles exposure.

Of those exposed, determine which have no evidence of immunity (§4.3), and implement appropriate prevention measures (§5.4).

4.3 Determine Measles Immune Status of Contacts

All of the following are considered evidence of immunity:

- Birth before 1957 (see §6.2)
- Laboratory-confirmed disease
- Laboratory evidence of immunity (protective antibody titers); or
- Documentation of vaccination[4].

Only doses with written documentation of the date of administration are considered valid; self-reported doses should not be counted. The vaccination status of persons for whom vaccination is not documented should be classified as "unknown." Persons are categorized as "unvaccinated" if they report that they had no history of being vaccinated; if available, immunization records should be checked to verify lack of vaccine receipt.

[4]In individuals who were vaccinated in the United States during childhood, a positive rubella antibody titer may be used as evidence of previous MMR vaccination.

5. CONTROLLING FURTHER SPREAD

5.1 Definition of an Outbreak

An outbreak is defined as three or more cases linked by time and place.

5.2 Education of Contacts

Contacts should be asked to watch for symptoms of measles for 21 days after the last day of contact with the case during their communicable period. If symptoms develop, they should be instructed to call the local health department immediately. Should they choose or need to seek care, they should be instructed *whenever feasible* to call ahead to healthcare facilities so that arrangements can be made to prevent additional exposures. **Emergency care should never be delayed for facility notification.** The LHD can also notify facilities in advance on behalf of the individual.

5.3 Isolation of Cases

Case should be isolated through 4 days following rash onset. Keep hospitalized patients under airborne precautions for 4 days after rash onset. Exclude cases with confirmed and presumptive measles from child care, school and work (ORS 433.255; OAR 333-019-0010). Advise cases to stay home and avoid contact with others.

5.4 Exclusion of Contacts and Quarantine

Exposed persons who cannot readily document presumptive evidence of measles immunity should be offered postexposure prophylaxis (PEP) or excluded from child care, school, and work from 5 days following their first exposure through 21 days following their last exposure to measles. This includes individuals exempted from measles vaccination for medical or non-medical reasons.

In general, exposed persons without evidence of immunity should be offered MMR vaccine, be excluded from high-risk settings (e.g., schools, hospitals, day cares), and advised to avoid travel during the incubation period, and, if symptoms develop, to avoid contact with others. Local authorities should enter exposed individuals during air travel into the contact tracker database (see 6.1).

Mandatory quarantine is not typically indicated for mitigation of measles transmission. However, targeted (most commonly voluntary) quarantine may be

considered to safeguard vulnerable populations. Under exceptional circumstances, such as during outbreaks in schools attended by large numbers of persons who refuse vaccination, restriction of an event or other quarantine measures might be warranted (see §6).

A summary table for public health management of close contacts of measles cases is available at: https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/DISEASESAZ/Documents/ORMeaslesExposureSummaryTable.pdf.

5.5 Postexposure Prophylaxis

There are two types of post-exposure prophylaxis for measles:

- MMR vaccine: must be administered within 3 days (72 hours) of initial measles exposure.
- Immunoglobulin (IG): must be administered within 6 days of initial measles exposure.

In most studies, the MMR vaccine (infections rate estimates of 0–15%) has been shown to be more effective than IG (infection rate estimates of 0–30%) in preventing measles transmission. Do not administer MMR vaccine and IG simultaneously. PEP should not be delayed pending the return of laboratory titer results.

Active Immunization with MMR Vaccine

For vaccine-eligible people aged ≥6 months exposed to measles without contraindications to vaccination***, administration of MMR vaccine is preferable to IG.*** Vaccination should be offered at any interval following exposure to offer protection from future exposures.

For routine vaccination of children living in areas with ongoing measles transmission, early administration of MMR should be considered. The first dose of MMR may be given as early as 6–12 months. Children who receive their first dose of MMR prior to 12 months of age should receive two additional doses separated by at least 28 days after 12 months of age. The second dose of MMR may be given as early as 28 days after the first dose in children >12 months of age.

Passive Immunization with Immune Globulin

Infants <6 months of age, pregnant women without evidence of measles immunity, and severely immunocompromised individuals are at risk for severe disease and not eligible for MMR vaccination. These groups should be prioritized to receive IG.

Patients should be warned that IG may increase the incubation period of measles to 28 days.

For assistance obtaining state-supplied immune globulin, LPHAs should refer to the investigative guidelines for acquiring state-supplied prophylaxis.

5.6 Contact Monitoring

Contacts without evidence of immunity to measles should be passively monitored. Passive monitoring involves providing measles education (see §5.2) and to call the local health department immediately if symptoms develop. With widespread measles activity, active monitoring is not necessary in measles investigations. If capacity allows, local health departments can choose to actively monitor contacts. Active monitoring involves frequent (at least 3 times/week) reporting of symptoms to public health staff without visual contact.

6. MANAGING SPECIAL SITUATIONS

6.1 Case among Employees or Attendees at School or Child Care Facility

Exclude all unimmunized children and staff without evidence of immunity from 5 days following their first exposure through 21 days following their last exposure to measles. At the health officer's discretion, these persons can be readmitted once vaccinated. School students with a single dose of MMR vaccine may also return to school at the health officer’s discretion.

6.2 Management of Cases in a Health Care Setting

Control and containment efforts in health care settings should focus on reviewing employee immunization records and enforcing patient isolation best practices. All health care personnel (HCP), trainees, and volunteers including support staff should have evidence of immunity to measles on file.

Patient Placement and Transport

When measles is circulating, health care facilities should attempt to promptly

identify patients with suspected measles through implementation of screening procedures for febrile rash or known measles exposures. Patients with symptoms compatible with measles should not be placed in shared spaces, such as waiting rooms. When the LHD is aware that measles is possible (e.g., a known symptomatic contact who is referred to care), they should alert facilities prior to arrival to minimize the risk of exposure to others.

Suspect measles cases should have source control (i.e., a well-fitting facemask) placed immediately (ideally prior to entry into the facility) and should be taken directly to an airborne infection isolation room (AIIR). If an AIIR is not available, the masked patient should be placed in a private room with the door closed. The patient should remain masked throughout the encounter, if possible. If feasible, place the patient in a room that minimizes shared air with other locations.

After the patient leaves the room, it should remain vacant for the appropriate time (up to 2 hours) to allow for 99.9% of airborne-contaminant removal

Transport and movement of suspect measles cases should be limited, and source control should be used whenever patient transport is required.

Patient Visitation

During the infectious period, visitors should be limited to those who have evidence of immunity and who are necessary for the patient's well-being and care. Visitors should be offered a respirator to minimize their risk.

Health Care Personnel and Environmental Infection Control

Only HCP with evidence of immunity to measles should enter the room of a person with suspect measles. All HCP should use a fit-tested, NIOSH-certified disposable N95 respirator (or an alternative respiratory protection device such as a Powered Air-Purifying Respiratory (PAPR)) upon entry to the care area of a patient with suspect or confirmed measles. HCP should be trained in proper use, safe removal, and disposal of respirators.

Standard cleaning and disinfection procedures should be used for measles virus environmental control in all healthcare settings. Ensure use of an EPA-registered disinfectant and follow manufacturer's instructions.

Management of Exposed Health Care Personnel

If a case with measles was treated at a healthcare facility during their period of communicability, identify potentially exposed healthcare personnel (see §4.2) and assess their documented immune status.

HCP who are nonimmune, have unknown immunity, or are severely immunocompromised should be excluded from work from 5 days following their first exposure through 21 days following their last exposure and monitored daily for symptoms regardless of whether they have received post-exposure prophylaxis. If IG was administered, extend monitoring to the 28 days following their last exposure, and consider extending work exclusion as well.

HCP with presumptive immunity including a single dose of MMR vaccine can continue working. HCP with a single dose of MMR vaccine should receive the second dose of MMR vaccine at least 28 days after the first dose. HCP who develop symptoms should be relieved from all patient care and excluded from the facility until their contagious period ends.

During an outbreak of measles, healthcare facilities serving the outbreak area should recommend 2 doses of MMR vaccine for non-immune personnel, including those born before 1957 who lack laboratory evidence of measles immunity or laboratory confirmation of disease.

Management of Exposed Contacts

Non-HCP contacts should likewise have their immune status assessed and be offered post-exposure prophylaxis if indicated; school and work restrictions for exposed, susceptible contacts apply. Healthcare facilities should identify and contact exposed patients (see §5.2); consult with the LPHA for assistance. When contacting exposed patients, inquire about any visitors who may have also been exposed.

Priority in contact tracing and management should first be given to immediate close contacts. Subsequently, contact identification may proceed at the discretion of the facility's infection preventionists for those who may have been exposed via the air flow to other areas of the hospital, if the nature of the HVAC system suggests true potential for exposure.

6.3 Public Exposure Notifications

Consult OHA before notifying the public regarding measles exposures to ensure coordination of communications. If requested, OHA is available to assist, including drafting press releases, contacting media representatives outside your local area, and notifying public health officials in other jurisdictions.

7. REFERENCES

1. Committee on Infectious Diseases, American Academy of Pediatrics. (2024). *Red Book: 2024–2027 Report of the Committee on Infectious Diseases* (33rd ed.). American Academy of Pediatrics. https://doi.org/10.1542/9781610027373
2. Farrar, J., Hotez, P. J., Junghanss, T., Kang, G., Lalloo, D., White, N. J., & Garcia, P. J. (24th Ed.). (2024). *Manson's Tropical Diseases*. Elsevier health sciences.
3. Montroy, J., Yan, C., Khan, F., Forbes, N., Krishnan, R., Tunis, M., & Salvadori, M. I. (2025). Post-exposure prophylaxis for the prevention of measles: A systematic review. *Vaccine*, *47*, 126706.

UPDATE LOG

July 2026. Removed active contact monitoring, updated LPHA roles and responsibilities (Liko, Sutton, Zhang).

April 2026. Simplified evidence of immunity, clarified guidance on when students can return to school, added considerations regarding visitation in health care facilities and use of rubella immunity as proxy for MMR vaccination. (Chiou, Liko, Sutton, Zhang).

February 2026. General revision for clarity (Chiou, Liko, Sutton, Zhang).

January 2026. Case definitions aligned with CSTE. Testing, vaccine, and post-exposure prophylaxis recommendations updated. (Chiou, Liko, Sutton, Zhang)

March 2025. Vit A recommendation added. (Liko)

December 2024. Confirmed case definition updated and laboratory reporting requirements clarified. (Cieslak, Liko).

July 2024. OSPHL testing criteria temporarily modified because of the ongoing outbreak. (Liko).

February 2021. Reporting period updated for LHDs. It's now immediately reportable. (Liko)

October 2020, Editing of some language and fixed formatting issues. (Liko)

November 2019. Updated flight investigation. (Liko)

June 2019. Second MMR recommended for eligible persons exposed to measles. (Cieslak, Liko, Wu)

November 2018. Sections on laboratory testing and contact investigation revised including introduction of PUM approach. (Liko, Pierce)

August 2018. Added clarification for laboratory testing approvals. (Humphrey, Liko)

June 2018. Added PCR testing at the OSPHL. (Liko)
April 2017. Confirmed case definition revised. (Liko)
March 2017. Lab section revised for clarity and to transport specimens to the OSPHL. (Liko)

October 2016. Table on the recommended interval before measles- or varicella- vaccine containing administration is deleted. (Liko)

May 2015. Added CDC's language about laboratory testing. (Liko)
March 2015. Added flowchart for testing criteria. (Liko)
February 2015. The lab section was updated. (Liko)

September 2014. Added clarification about other potential diagnosis for measles- like illnesses. (Liko)
March 2014. Urine specimen recommended in addition to NP swab; passive surveillance for UTD contacts clarified. (Liko)

August 2013. Outbreak definition revised. (Liko)

March 2013. The acceptable evidence of immunity is updated. (Liko)

December 2012. Clarified LHD responsibilities regarding measles testing at WSPHL. (Liko)

January 2012. Typo corrected in section 6.2 Healthcare workers should be excluded for 4 days after rash onset, not 7. (Cieslak)

September 2011. Reporting responsibilities revised. Also, revised the lab section adding testing availability at WSPHL. Section 6.4 “Going Public” was added. (Liko)

March 2011. Minor wordsmithing of case definitions. (Liko)
April 2010. Services available at OSPHL updated. (Liko)
April 2008. Revised 4.2 to reflect a concerted approach to the control of measles in Oregon based on high levels of measles vaccination in the community, national recommendations, and a focused attack on measles outbreak. Recommendations concerning identification of contacts were revised to recommend “20 minutes-10 meters rule” (down from 2 hours cutoff). (Cieslak, Liko)

October 2007. Case definitions revised to require symptoms. (Liko)

July 2006. Recommendations concerning follow- up to potential airborne exposures were revised to recommend a 2-hour cutoff (down from 4 hours). Longer periods are certainly possible, but the risk beyond 2 hours is apparently low enough that the juice isn't worth the squeeze. Not coincidentally this makes our recommendations more consistent with CDC's. (Liko)