



California Department of Public Health – February 2015

Measles Investigation Quicksheet



Measles infectious period

From four days before rash onset through four days after rash onset (day of rash onset is day 0).

Measles exposure

Sharing the same airspace with a person infectious with measles (during the 4 days prior through the 4 days after their rash onset), e.g., same classroom, home, clinic waiting room, airplane etc., or were in these areas up to 1 hour after the infectious person was present. Although CDC recommends using a 2 hour window, there is only one report in the literature of measles transmission >60 minutes after an infectious person has left the setting.

No minimum time period has been established for exposure, but it is presumed that longer exposures are more likely to result in measles transmission than brief, transient exposures.

When exposures have occurred in venues in which it is not possible to identify individuals, it is helpful to notify local health care providers so that they can be on the alert for possible cases. In addition, some local health jurisdictions have issued press releases to notify the public.

Measles incubation period

Prodromal symptoms typically begin 8-12 days after exposure (day 0) and rash onset is typically 14 days (range 7-21 days) after exposure.

Measles clinical case definition

- A generalized rash lasting ≥ 3 days; and
- a temperature $\geq 101^\circ\text{F}$ ($\geq 38.3^\circ\text{C}$); and
- cough, coryza, or conjunctivitis.

Measles laboratory criteria for diagnosis

- Serum* measles IgM antibody positive; or
- Significant rise in serum* measles IgG antibody between acute and convalescent titers; or
- Isolation of measles virus; or
- Detection of viral RNA by reverse transcription polymerase chain reaction (RT-PCR).

*Capillary blood (finger or heel stick) can be used for serology if venous blood cannot be obtained.

Please send specimens to a public health lab; use of commercial labs may delay testing. For more information on testing, including capillary blood collection, is available at:

<http://www.cdph.ca.gov/HealthInfo/discond/Documents/CDPHMeaslesLabTesting2011-01.pdf>

Case classification

- **Suspected:** Any febrile rash illness.
- **Probable:** A case that meets the clinical case definition, has non-contributory or no serologic or virologic testing, and is not epidemiologically-linked to a confirmed case.
- **Confirmed:** A case that is laboratory-confirmed; or a case that meets the clinical case definition and is epidemiologically-linked to a confirmed case. A laboratory-confirmed case does not need to meet the clinical case definition.

Immunity to measles

Non high-risk people[†] can be presumed to be immune to measles for the purposes of measles case investigations if they:

- were born prior to 1957; or
- have written documentation with dates of receipt of at least one dose of measles-containing vaccine given on or after their first birthday; ‡ or
- have documented IgG+ test for measles; or
- have a history of physician diagnosed measles; or
- served in the U.S. armed forces; or
- were born in U.S. in 1970 or later and attended a U.S. elementary school; § or
- entered the U.S. in 1996 or later with an immigrant visa or have a green card. §

[†] Additional evidence of immunity is required for exposed high-risk persons, e.g., healthcare personnel of any age, pregnant women, immunocompromised people, household contacts of a case, or persons in settings with known unvaccinated persons (e.g., childcare settings). Additional evidence of immunity may also be required during an outbreak. Immunity can be presumed if the exposed person:

- has documentation of a positive measles IgG test; or
- has documentation of two doses of measles-containing vaccine separated by at least 28 days, with the first dose on or after the first birthday. ‡

[‡] Administered in 1968 or later.

[§] Unless known to be unvaccinated for measles, e.g., having a medical contraindication to vaccination or being philosophically or religiously opposed to vaccinations.

MMR vaccine for postexposure prophylaxis

MMR vaccine may be given <72 hours of exposure to persons ≥ 6 months of age with 1 or no documented doses of MMR, if not contraindicated.

Immune globulin (IG) for postexposure prophylaxis

IG may be given to exposed susceptible people of any age ≤ 6 days of exposure to prevent infection.

- Infants <12 months of age should receive 0.5 mL/kg of body weight of intramuscular IG (IGIM); maximum dose = 15 mL.||
- Pregnant women without evidence of measles immunity should receive 400 mg/kg of intravenous IG (IGIV).
- Severely immunocompromised¶ persons, irrespective of evidence of measles immunity, should receive 400 mg/kg of IGIV.
- For persons already receiving IGIV therapy, administration of ≥ 400 mg/kg body weight <3 weeks before measles exposure should be sufficient to prevent measles infection.
- For patients receiving subcutaneous IG (IGSC) therapy, administration of at ≥ 200 mg/kg body weight for 2 consecutive weeks before measles exposure should be sufficient.
- Other persons who do not have evidence of measles immunity can be given IGIM (0.5 mL/kg of body weight; maximum dose = 15 mL), but priority should be given to susceptible persons exposed in settings with intense, prolonged, close contact (e.g., household, childcare, classroom, etc.) because IGIM is expected to be less effective in persons weighing >30 kg/66 lbs.||

|| Information on IG administration is available at:
<http://www.cdph.ca.gov/HealthInfo/discond/Documents/CDPHIGforMeaslesPEP.pdf>

¶ Patients with severe primary immunodeficiency; patients who have received a bone marrow transplant until at least 12 months after finishing all immunosuppressive treatment, or longer in patients who have developed graft-versus-host disease; patients on treatment for ALL within and until at least 6 months after completion of immunosuppressive chemotherapy; and patients with a diagnosis of AIDS or HIV-infected persons with severe immunosuppression defined as CD4 percent <15% (all ages) or CD4 count <200 lymphocytes/mm³ (aged >5 years) and those who have not received MMR vaccine since receiving effective ART. Some experts include HIV-infected persons who lack recent confirmation of immunologic status or measles immunity.

It is unknown if IG prolongs the incubation period, but if a contact who received IG is excluded from a high risk setting, CDPH does not recommend extending the exclusion beyond 21 days. However, symptoms should be monitored for an additional 7 days and if measles symptoms occur ≤ 28 days of exposure, persons who have received IG should self-isolate and contact their local health department.

One source of IG is FFF Enterprises in Temecula CA, which can be reached 24/7 at: 1-800-843-7477.

Home quarantine/symptom watch period

Day 7 (CDC recommends day 5 for healthcare workers) after first exposure through day 21 after last exposure (day of exposure is day 0).

If symptoms consistent with measles develop, patient should be immediately isolated through day 4 after rash onset (day of rash onset is day 0). Exposed people should be instructed to isolate themselves and notify their local health department immediately if symptoms occur.

The course of measles infection

Measles typically begins with a mild to moderate fever accompanied by cough, coryza, and conjunctivitis. Two to three days later, Koplik's spots, a characteristic sign of measles, may appear. At this time the fever spikes, often $\geq 104^\circ\text{F}$.

At the same time, a red blotchy maculopapular rash appears, usually first on the face, along the hairline and behind the ears. This slightly itchy rash rapidly spreads downward to the chest and back and finally, to the thighs and feet. In approximately one week, the rash fades in the same sequence that it appeared.

Measles symptoms

- Fever
- Dry cough
- Runny nose
- Inflamed eyes (conjunctivitis)
- Sensitivity to light
- Koplik's spots (tiny red spots with bluish-white centers inside mouth on the lining of the cheek)
- An erythematous maculopapular rash - large, flat blotches that often flow into one another

Measles treatment

No specific treatment is available for measles, but administration of vitamin A once daily for two consecutive days has been associated with reduced risk of mortality in children <2 years of age.

WHO recommends vitamin A for all children with acute measles, regardless of their country of residence. Vitamin A is administered once daily for two consecutive days, at the following doses:

- 50,000 IU for infants <6 months of age
- 100,000 IU for infants 6 to ≤ 11 months of age
- 200,000 IU for children ≥ 12 months of age



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RECOMMENDED FOLLOW-UP MEASLES CONTACTS					
	IgG testing	Postexposure prophylaxis²	Quarantine³	Exclusion⁴	Symptom watch
<i>Measles immunity assessment</i>					
Two documented doses of MMR vaccine (~1% will be susceptible)	No	No	No	No	Passive
Measles IgG positive (<1% will be susceptible)	No	No	No	No	Passive
Have 1 documented dose of MMR vaccine (5% will be susceptible)	If desired	No ⁵	No	Yes	Passive
Born before 1957 (5% will be susceptible)	If desired	No ⁵	No	Yes	Passive
History of measles disease (Not documented)	Yes	No ⁵	Yes	Yes	Active
Unknown or no documentation of measles vaccination or immunity status	Yes	No ⁵	Yes	Yes	Active
Measles IgG negative or known to be unvaccinated	-	Yes	Yes	Yes	Active
Received MMR vaccine <72 hours of exposure ⁶	-	-	No	Yes	Active
Received immune globulin ≤6 days of exposure	-	-	No	Yes	Active
Unknown or no documentation of vaccination or immune status, but presumed to be immune to measles ⁷	If desired	No	No	Yes	Passive
Unknown or no documentation of vaccination or immune status; no presumption of immunity	Yes	No ⁵	Yes	Yes	Active
Measles IgG negative or known to be unvaccinated	-	Yes	Yes	Yes	Active
Received MMR vaccine <72 hours of exposure ⁶	-	-	No	Yes	Active
Received IG ≤6 days of exposure	-	-	No	Yes	Active
<i>Special Groups</i>					
Severely immunocompromised or pregnant and without 2 documented MMR or serologic evidence of immunity	Yes ⁹	Yes ¹⁰	See footnote ⁸	Yes	Active
Household contact or other contact with prolonged exposure without 2 documented MMR or serologic evidence of immunity	Yes	No ⁵	Yes	Yes	Active

1. A high-risk contact is defined as an exposed person who is at high-risk of measles infection (household or childcare contact) or complications (infant, pregnant or immunocompromised person) or who works in or attends a high-risk setting (healthcare personnel of any age, staff or attendees of childcare setting with unvaccinated infants).
2. Postexposure prophylaxis is either IG or MMR vaccine. IG may be administered ≤6 days of last exposure to susceptible contacts of any age who did not receive MMR vaccine <72 hours of exposure. Any nonimmune person exposed to measles who received IG should receive MMR vaccine no earlier than 6 months after IGIM administration or 8 months after IGIV administration. If it can be done rapidly, we recommend testing healthy contacts >12 months of age for measles IgG prior to administering IG if there is a possibility they may have received vaccine or had disease in the past.
3. Unless found to be measles IgG positive, quarantine for 21 days after last exposure. If symptoms consistent with measles develop, exposed person should be isolated. If there is concern about whether measles symptoms will be reported or if there will be compliance with quarantine, periodic calls to the exposed person to monitor for development of measles symptoms are recommended (see above for symptom watch time period and additional guidance).
4. Unless found to be measles IgG positive, exclude from high-risk settings (e.g., healthcare or childcare facility with infants).
5. If an exposed person is identified as susceptible through serologic testing (measles IgG negative), then postexposure prophylaxis should be offered if it is within the recommended time period; alternatively, if immune status is unknown and immunity testing cannot be done in a timely way, postexposure prophylaxis can be considered.
6. If measles IgG status is unknown, persons >12 months of age who may have been vaccinated or had disease and receive MMR vaccine as postexposure prophylaxis should have blood drawn and tested at the time of MMR administration.
7. Immunity may be presumed in persons who have served in the U.S. Armed Forces, or were born in the U.S. in 1970 or later and attended a U.S. elementary school; or entered the U.S. in 1996 or later with an immigrant visa or have a green card (unless known to be unvaccinated).
8. CDPH should be consulted about severely immunocompromised measles contacts to assess the need for quarantine. Pregnant contacts should be provided quarantine instructions consistent with their measles immunity assessment (above).
9. If no documentation of 2 MMR doses or measles IgG positivity is not available.
10. If patient is IgG negative, or if patient has unknown status and testing cannot be completed by day 6 post-exposure, administer IGIV.