



Measles Clinical Guidance: Identification, Testing and Isolation of Suspect Measles Cases January 2016

In 2012, a measles outbreak occurred in Indiana associated with the 46th Super Bowl. Media reports state that the source of the outbreak was a couple who had traveled abroad prior to the Super Bowl and were infectious with measles while attending events in Super Bowl Village. At least 16 measles cases were associated with this outbreak. Since measles continues to circulate in much of the world outside of North and South America, international travel, as well as domestic travel through international airports, can be a risk for exposure to measles. Clinicians should be on alert for measles particularly during events with many travelers.

To prevent spread of measles, California healthcare providers are recommended to:

Remember the diagnosis

Your expert eye, diagnostic skills, and prompt reporting of suspect measles patients to public health can make a difference in stopping the spread of this highly contagious disease in your community.

Key Points

- Consider measles in patients of any age who have **a fever AND a rash**
- In measles cases there **must be some fever**, even subjective fever, and the **rash must start on the head or neck**.
- Patients with measles usually have at least 1 or 2 of the **"3 Cs" – cough, coryza and conjunctivitis**. If measles testing is being considered, **please contact your local health department immediately, see http://www.cdph.ca.gov/programs/cclho/Documents/LHD_CD_Contact_Info.doc**
Your local health department is your partner and will assist you.

Isolate patients with acute febrile rash illnesses

Patients with rash and fever may have measles or other communicable diseases that can be transmitted to other patients. It is prudent to isolate such patients until measles or other diseases such as varicella have been ruled out (see isolation instructions on page 3). If measles is suspected, alert your local health department as soon as possible. The risk of measles transmission to others can be reduced if control measures are implemented immediately. When evaluating a suspect measles case, healthcare personnel should wear an N95 mask, even if they have previously provided adequate documentation of measles immunity.

Questions to ask patients with febrile rash illness

- **Fever assessment:**
 - When did the fever start? (in cases of measles, fever usually precedes the rash)
 - How high has the fever been without the use of antipyretics (or is the fever subjective)?
 - Did the fever persist, or did it disappear? (if fever disappeared before rash onset without the use of antipyretics, the patient is unlikely to have measles)
 - Fever generally peaks on day 2 or 3 after rash onset; fever persisting longer than this in a confirmed measles case is an indication of a complication.
- **Rash assessment:**
 - Measles rashes typically start on the forehead at the hairline and behind the ears and then spread downwards to the rest of the body; measles rashes in vaccinated people follow the same pattern but may be less intense and may not spread to the entire body.
 - Measles rashes are initially erythematous and maculopapular but progress to confluence in the same manner as the spread of the rash. Confluence is most prominent on the face.
 - The rash begins to clear on the third or fourth day in the same order it appeared; duration of the rash is usually 6-7 days. Rashes may resolve more quickly in vaccinated people.
 - During the initial stages of the rash, it is red and blanches with pressure. As the rash fades, it takes on a coppery appearance, after which a brownish discoloration is seen that does not clear with pressure.

Note: The only people who have measles rashes that do not start on the head or neck are adults who received killed measles vaccine during 1963-1967 and develop what is called “atypical” measles, but this is not common, and testing should be prioritized to patients with typical measles rashes.

- **Questions for rash assessment:**
 - When did the rash start? (persons with measles are infectious for 4 days before rash onset)
 - What does the rash look like? (typically red and maculopapular at onset)
 - Where is the rash located? (usually involves at least the head)
 - What was the progression of the rash? (i.e., did it begin on head and spread down, as typically occurs in measles?)
 - Has the rash started disappearing? (in classic measles, the rash does not begin to disappear until 3-4 days after rash onset; in vaccinated individuals, the rash may disappear faster, but it should still last at least several days)
 - Does the rash itch? (measles rashes may itch, but not until at least the fourth day after rash onset)
 - Consider taking a photo of the rash to share with the local public health department.
 - Are there alternative explanations for the rash (e.g., has the patient been on antibiotics)? See page 4 for possible alternative diagnoses.
- **Assessment of other symptoms:**
 - Classic measles symptoms typically include the “3 Cs”- cough, coryza and conjunctivitis.
 - Does the patient have cough, runny nose, red eyes, or white (Koplik) spots in the mouth? (it is unusual for unvaccinated people with measles not to have at least 1 or 2 of the 3 Cs).
 - Is the patient miserable? (in classic measles, children are always miserable; adults may be less miserable).
 - In previously vaccinated persons, symptoms may be milder and all 3 Cs may not be present.

- **Other questions:**

- Has patient received MMR vaccine? If so, how many doses, and when?

Note: Although documentation of receipt of two doses of MMR vaccine or a prior positive measles IgG test result makes the diagnosis of measles less likely, measles can still occur in such persons.

- Has patient traveled outside of North or South America or had contact with international travelers (including transit through an international airport or visit to an international tourist attraction in the U.S.), visits to healthcare facilities or crowded locations, or contact with ill individuals in the 7-21 days before rash onset?
- Has patient had any recent domestic travel?

Note: if travel occurred while the patient was potentially infectious (four days prior to through four days after rash onset) please alert the local health jurisdiction when you report the suspect case, and if possible collect the patient's travel itinerary.

- Are any high-risk situations present? (e.g., patient attends childcare setting with infants or has visited other healthcare facilities while ill).

Note: Approximately 5% of children who receive MMR vaccine may develop a vaccine-related rash and fever, typically 6-12 days after receipt of vaccine. These rashes can look like classic measles and children can appear quite ill. If such children are tested for measles, they will likely be PCR and IgM positive for measles. However, genotyping can be done to determine whether the virus is wild or vaccine-type.

Laboratory testing for suspect measles cases

- **Collect specimens for measles testing:**

- For patients presenting ≤ 7 days of rash onset:
 - Obtain a throat swab (preferred over NP swab) and urine for PCR testing. CDPH is prioritizing PCR testing, rather than serology for patients who present ≤ 7 days of rash, rather than collection of a blood specimen.
 - Use a synthetic swab (Dacron) to perform throat swab and place into viral transport media.
 - Collect 50-100 ml of urine in a sterile centrifuge tube or urine specimen container.
- If patient presents > 7 days of rash onset:
 - Obtain urine for PCR testing and blood for serology.
 - Collect 50-100 ml of urine in a sterile centrifuge tube or urine specimen container.
 - Draw 7-10 ml blood in a red-top or serum separator tube; spin down serum if possible.
Note: capillary blood (approximately 3 capillary tubes to yield 100 μ l of serum) may be collected in situations where venipuncture is not preferred, such as children < 1 year of age.
- Please arrange for measles testing at a public health laboratory by contacting the local health jurisdiction: http://www.cdph.ca.gov/programs/cclho/Documents/LHD_CD_Contact_Info.doc; use of commercial labs may delay testing.
- **Do not submit specimens to a public health laboratory without first informing or consulting with the local health department.** California reporting rules require notification of the local health department by telephone immediately if measles is suspected. See: https://www.cdph.ca.gov/HealthInfo/Documents/Reportable_Diseases_Conditions.pdf

Isolate suspect measles patients

If measles is suspected (complete infection control guidance at: <http://tinyurl.com/lfpk3yn>):

1. Mask suspect measles patients immediately. If a surgical mask cannot be tolerated, other practical means of source containment should be implemented (e.g., place a blanket loosely over the heads of infants and young children suspected to have measles when they are in the waiting room or other common areas).
2. Do not allow suspect measles patients to remain in the waiting area or other common areas; isolate them immediately in an airborne infection isolation room if one is available. If such a room is not available, place patient in a private room with the door closed. For additional infection control information, please see the CDC "Guideline for Isolation Precautions" at: <http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html>
3. If possible, allow only healthcare personnel with documentation of 2 doses of live measles vaccine or laboratory evidence of immunity (measles IgG positive) to enter the patient's room.
4. Regardless of immune status, all healthcare personnel entering the patient room should use respiratory protection at least as effective as an N95 respirator per CalOSHA requirements.
5. If possible, do not allow susceptible visitors/staff in the patient room.
6. Depending on the number of air changes per hour (<http://tinyurl.com/lfpk3yn>), do not use the examination room for up to one hour after the possibly infectious patient leaves.
7. If possible, schedule suspect measles patients at the end of the day. When given advance notice, some providers have seen and collected specimens from patients outside the outpatient setting, e.g., cars, garages.
8. Notify any location where the patient is being referred for additional clinical evaluation or laboratory testing about the patient's suspect measles status and do not refer suspect measles patients to other locations unless appropriate infection control measures can be implemented at those locations.
9. Instruct suspect measles patients and exposed persons to inform all healthcare providers of the possibility of measles prior to entering a healthcare facility so that appropriate infection control precautions can be implemented.
10. Make note of the staff and other patients who were in the area during the time the suspect measles patient was in the facility and for one hour after the suspect measles patient left. If measles is confirmed in the suspect measles patient, exposed people will need to be assessed for measles immunity.

Note: If patient is a traveler, advise them to self-isolate in their hotel room until the local health jurisdiction can reach them to provide further instruction.

Post-exposure prophylaxis (PEP) for susceptible people exposed to measles

- Please consult with your local health jurisdiction regarding appropriate administration of PEP.
 - MMR vaccine can be administered within 72 hours of exposure.
 - Immune globulin (intramuscular or intravenous, depending on patient) can be administered through day 6 after exposure.
 - Information about the use of immune globulin for measles PEP is available at: <http://www.cdph.ca.gov/HealthInfo/discond/Documents/CDPHIGforMeaslesPEP.pdf>

Alternative diagnoses to consider for persons with fever and rash:

- **Drug eruption:** history of current or recent medication, especially an antibiotic
- **Other non-infectious rashes:** hives or atopic dermatitis with coincidental febrile illness
- **Varicella (chicken pox):** vesicular lesions on erythematous base
- **Enteroviruses (e.g., hand-foot-and-mouth disease):** oral ulcers, rash on hands, feet, buttocks
- **Mononucleosis syndrome (EBV, CMV, HIV):** risk factors (young adulthood, MSM, IDU), sore throat or tonsillitis, prominent adenopathy, splenomegaly, atypical lymphocytosis
- **Parvovirus B-19 (also known as erythema infectiosum, or 5th disease):** slapped cheek appearance in children, arthritis and diffuse rash in adults
- **HHV-6 (also known as roseola infantum, exanthem subitum, or 6th disease):** disease of very young children (usually under 2 years of age), high fever followed by defervescence and the appearance of rash on trunk
- **Rubella (German measles):** history of international travel; mild illness with low-grade fever; arthralgias prominent in adults; prominent postauricular, posterior cervical, and suboccipital adenopathy
- **Streptococcal infection (with scarlet fever rash):** sore throat, “sandpapery” rash, circumoral pallor, strawberry tongue, positive strep test
- **Meningococemia:** abrupt onset of flu-like illness with marked myalgias (especially the legs); skin evolves from pallid or mottled with cold hands to petechial then hemorrhagic rash, severe headache and mental status change if meningitis present
- **Kawasaki disease:** children <5 years, fissured lips, strawberry tongue, erythema and edema of hands and feet, periungual desquamation, adenopathy
- **Travel-, animal-, and tick-related:** broad differential diagnosis of fever and rash
- **Influenza:** In 2015, CDC received reports of influenza cases with rash

Local Health Jurisdiction Contact Numbers for Communicable Disease Reporting

http://www.cdph.ca.gov/programs/cclho/Documents/LHD_CD_Contact_Info.doc