June 2019

# Measles Clinical Guidance:
# Identification & Testing of Suspect Measles Cases

The United States declared measles eliminated in 2000, meaning that there is not endemic transmission within the country and reported cases are due to infection while visiting another country. Measles continues to circulate in much of the world, including Europe, Asia and Africa. International travel, domestic travel through international airports, and contact with international visitors can pose a risk for exposure to measles. When measles is imported into the United States, additional transmission can occur locally.

While providers should consider measles in patients with fever and a descending rash, measles is unlikely in the absence of confirmed measles cases in your community or a history of travel or exposure to travelers. This guidance discusses which patients should be prioritized for measles testing.

## Testing for measles should be based on:

A) Measles symptoms:

- *Fever,* including subjective fever.
- *Rash that starts on the head and descends*.
- Usually 1 or 2 of the 3 "Cs" – *cough, coryza and conjunctivitis*.

B) Risk factors increasing the likelihood of a measles diagnosis:

- In the prior 3 weeks: travel outside of North America, transit through U.S. international airports, or interaction with foreign visitors, including at a U.S. tourist attraction.
- Confirmed measles cases in your community.
- Never immunized with measles vaccine and born in 1957 or later.

NOTE: Fever and rash occur in approximately 5% of MMR vaccine recipients, typically 6-12 days after immunization. Such reactions can be clinically identical to measles infection, and result in positive laboratory testing for measles. This reflects an immune response due to exposure to measles vaccine virus rather than wild measles virus and the patient is not infectious. If a recently vaccinated patient has fever and rash but none of the risk factors for measles described above, measles is extremely unlikely, and testing is usually unnecessary.

If after consideration of symptoms and risk factors, you suspect measles, please contact your local health department immediately and isolate the patient in airborne isolation precautions.

## Symptoms:

With measles, *FEVER* typically:

- Precedes the rash;
- Is high (up to 105° F);
- Persists after the rash erupts; and
- Peaks on day two or three after rash onset but can persist with secondary infection.

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With measles, the *RASH* typically:

- Starts on the forehead at the hairline and behind the ears and then spreads downwards to the rest of the body; in vaccinated people the rash may be less intense and not spread to the entire body;
- Is erythematous and maculopapular, progressing to confluence;
- Clears on the third or fourth day in the same order it appeared; duration is usually 6-7 days;
- Is initially red and blanches with pressure, then fades to a coppery appearance, and finally to a brownish discoloration that does not blanche with pressure;
- Not itchy until at least the fourth day after onset.

Consider taking a photo of the rash to share with the local health department. In the absence of known risk factors, consider possible alternative diagnoses, including drug reactions (See Alternative Diagnosis Section).

Other symptoms may include:

- At least one of the prodromal 3 "Cs"- cough, coryza and conjunctivitis;
- Koplik spots in the mouth early in illness;
- Feeling miserable, especially for children;
- In previously vaccinated persons, symptoms may be milder, and all 3 "Cs" may not be present.

## Laboratory testing, specimen collection, and specimen shipment:

**PCR** is the preferred testing method for measles and can only be performed at public health laboratories. Nasopharyngeal (NP) or throat swabs and urine should be collected for submission to the West Virginia Office of Laboratory Services (OLS). Specimens will be submitted to the Wisconsin State Laboratory of Hygiene (WSLH) for PCR testing. This testing is done free of charge to the patient and provider but must be coordinated through the local health department in order to obtain prior approval.

Public health laboratories do not typically accept serum specimens. If the provider can collect serum at the same time as the specimens for viral PCR, the serum will need to be tested at a commercial laboratory at patient or provider cost. Serologic testing for measles infection can result in falsely positive IgM test results, making it important to also collect specimens for confirmatory viral PCR testing.

Specimens should be collected as soon as possible after rash onset and should not be delayed until any pending laboratory confirmation is obtained. Specimens should ideally be collected within three days after rash onset and not more than 10 days after rash onset.

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Nasopharyngeal (NP) or throat swab:

- Use sterile Dacron or synthetic swab and place in to 2-3 mL of Remel M4 RT or equivalent viral transport medium (VTM).
- The swab can be broken off into the tube.
- Store swab in VTM at 4°C if shipping within 24 hours.
- Ship on cold packs.
- If immediate (within 48 hours) cold shipment cannot be arranged, swab should be removed from the VTM by gently swirling the swab in the fluid and then ream the swab against the side of the tube. Freeze at -70°C and ship on dry ice.

Urine:

- Collect 10-50 mL of urine in sterile container.
- Do not add VTM.
- Ship on cold packs within 24 hours.
- If shipping after 24 hours, freeze at -70°C and ship frozen on dry ice.

Make sure that the specimen collection vessel is labeled with:

- Patient Name (should match the name on the submission form exactly).
- Date of birth.
- Date of collection.

Complete a WSLH VPD submission form for each specimen and include it in the shipment.
http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/documents/vpd-submission-form.pdf

Ship the specimen(s) to OLS according to the following recommendations:

| Assay | Specimen Type | Minimum Volume | Storage Recommendations | Anticipated Turn Around Time |
|---|---|---|---|---|
| Measles Virus PCR and Genotyping | Nasopharyngeal (NP) swab, throat swab, or urine | 250 µL | **SWAB** – Store swab in viral transport medium (Remel M4 RT or equivalent) at 4°C if shipping within 24 hours. Ship on cold packs. **URINE** – Collect 10-50 mL of urine in sterile container. Do not add viral transport medium. Ship on cold packs if shipping within 24 hours. | PCR = 2 business days Genotyping = 10 business days |

Source: http://www.dhhr.wv.gov/oeps/disease/IBD_VPD/VPD/documents/vpd-reference-testing.pdf
Packages must be properly labeled as UN3373 Biological Substances and shipped per current Department of Transportation regulations.

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Send specimens to:

WV Office of Laboratory Services

ATTN: VPD Referral/Micro

167 11th Avenue

South Charleston, WV 25303

Telephone: 304-558-3530

NOTE: If shipping on dry ice, the package must be labeled with a UN1845 label, with the weight of the dry ice in the shipping container stated on the label. If a frozen specimen needs to be shipped directly to WSLH, OLS must be consulted before the shipment is made.

Serology:

- Collect blood by venipuncture or by finger/heel stick.
- Use tubes without additives: plain, red-top tube or a serum separator tube.
- Collect at least 300 µL of serum.
- Refrigerate at 4°C, do not freeze.
- Ship serum on cold packs.

Note: capillary blood (approximately 3 capillary tubes to yield 100 µl of serum) may be collected in situations where venipuncture is not preferred, such as children <1 year of age.

## Alternative diagnoses to consider for patients 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: 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 <2 years of age), high fever followed by defervescence and the appearance of rash on trunk.
- Group A streptococcal infection (with scarlet fever rash): sore throat, “sandpapery” rash, circumoral pallor, strawberry tongue, positive strep test.

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- Meningococcemia: 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 diagnoses of fever and rash.
- Influenza: influenza cases with rash have been reported.

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