The Warde Report

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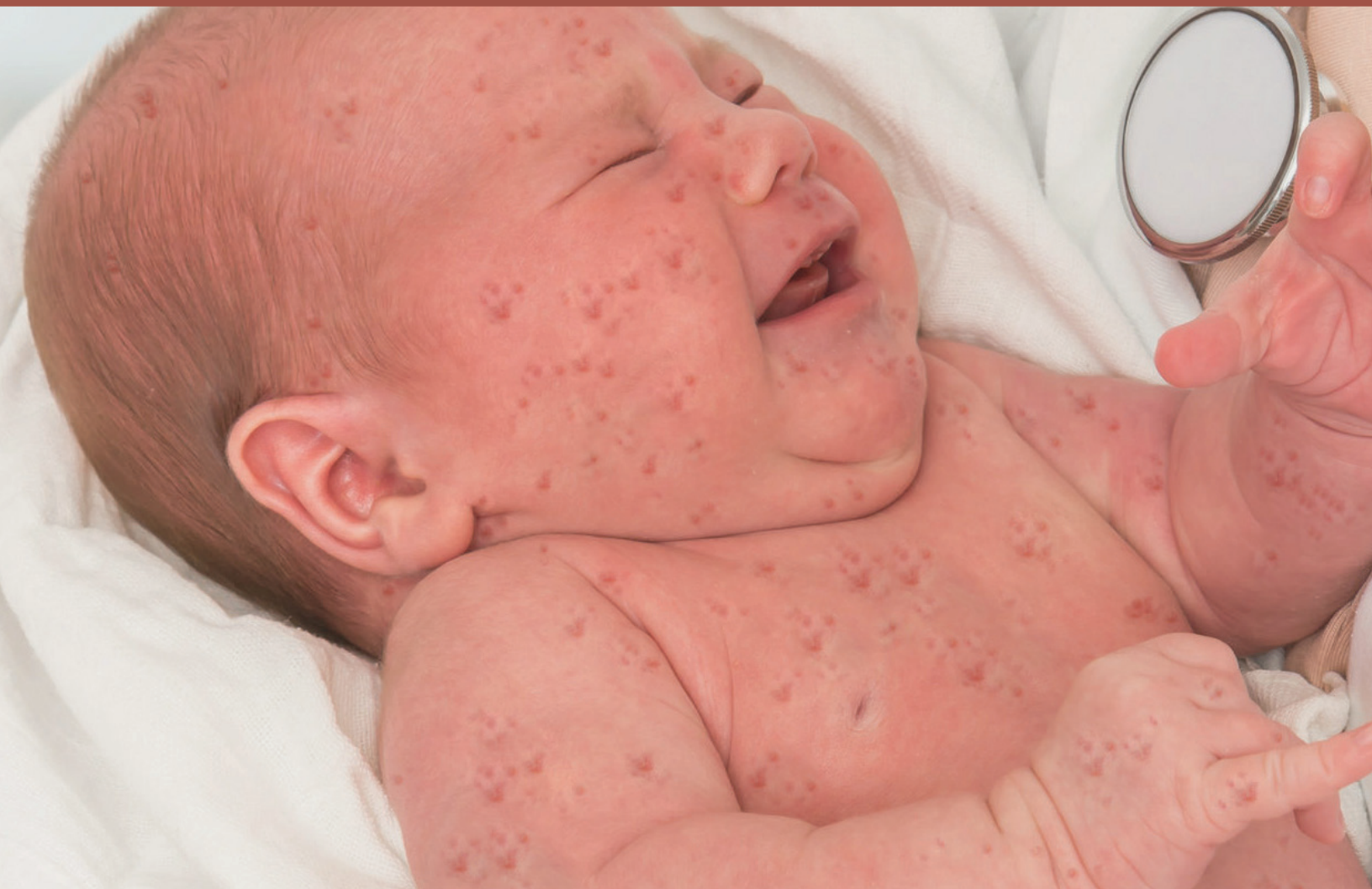
At a Glance:
Measles (Rubeola) Virus

"Quality in Laboratory Diagnosis"



At a Glance:
Measles (Rubeola) Virus

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Measles (Rubeola) is a highly communicable, vaccine-preventable disease that occurs throughout the world. Interruption of indigenous transmission has been achieved in the United States and other parts of the Western Hemisphere but measles outbreaks still occur periodically. (1) These outbreaks are generally linked to unvaccinated or under-vaccinated travelers returning from areas where measles remains endemic. (2)

From January 1 to March 14, 2019, 268 measles cases have been confirmed by the Centers for Disease Control and Prevention from 15 states. (3)

This document provides a simplified, at-a-glance guide for appropriate laboratory diagnostic approaches for individuals suspected of being infected with measles.

Laboratory Diagnosis

Public health officials recommend collecting a serum sample **AND** a throat swab for measles diagnosis. (1)

- Collect serum sample for Rubeola IgM (Warde test code: RUBEM).
- Draw blood in a SST tube.
- Following appropriate safety precautions, centrifuge the blood and separate the serum within 2 hours of collection.
- Send 0.5 mL serum (0.2 mL minimum) refrigerated in a screw-capped plastic vial, or frozen.

---- AND ----

- For Measles culture, collect a throat swab using a plastic shafted, Rayon, Dacron, or Nylon tipped swab or a flocked swab.
- DO NOT use Cotton-tipped or wooden-shafted swabs. Place the throat swab in viral transport medium and refrigerate.
- Order Virus Culture (Warde test code: VC) and mark the sample **"R/O Measles."**
- Put the same **"R/O Measles"** note in the comments section of the electronic order.

Serological Testing

- About 80% of infected patients will be Rubeola IgM-positive at rash onset.
- About 20% of specimens collected within the first 72 hours after rash onset may produce false-negative results.
- Tests that are negative in the first 72 hours after rash onset should be repeated 3-10 days after symptom onset. (1)
- IgM is detectable for at least 30 days after rash onset and frequently longer.

A Rubeola IgM-positive result may be diagnostic if done at the appropriate time.

Uninfected individuals will be Rubeola IgM negative. They will be Rubeola IgG negative or IgG positive, depending upon their previous infection or vaccination history.

It is important to limit Rubeola IgM serologic testing to cases in which there is legitimate concern for acute measles infection based on medical history and clinical findings. Overall, measles remains rare in the US, and the predictive value of IgM serologic testing in general may be low when testing low prevalence populations for the target disease.

Virus Isolation

- **Measles isolation is not recommended as a routine method to diagnose measles.**
- However, virus isolates are extremely important for molecular epidemiologic surveillance to help determine the geographic origin of the virus and the viral strains circulating in the United States.

- The CDC recommends collecting specimens for virus culture from every person with a clinically suspected case of measles. (1)
- **Clinical specimens for virus isolation should be collected at the same time as samples taken for serologic testing.**
- Nasopharyngeal swab samples should be collected within 3 and 10 days of rash onset. Earlier specimens are more likely to be culture positive and virus isolation rates diminish as the interval between rash onset and specimen collection increases.

Transmission / Incubation Period

- Measles is highly communicable and secondary attack rates of greater than 90% have been documented among susceptible individuals.

- Virus transmission is primarily via contact with large respiratory droplets.
- ***Airborne transmission via aerosolized droplet nuclei has been documented in closed areas (e.g., office examination room) for up to 2 hours after a person with measles occupied the area.***

- Patients are infectious from 1-2 days before the appearance of the prodromal respiratory symptoms to the fourth day after the appearance of rash.

Measles - Clinical Features

Incubation period 10-12 days from exposure to prodromal symptoms; 14-16 days from exposure to appearance of rash.

- Primary viremia 2-3 days after exposure
- Secondary viremia 5-7 days after exposure with spread to tissues

Prodrome 2-4 days, hallmarked by:

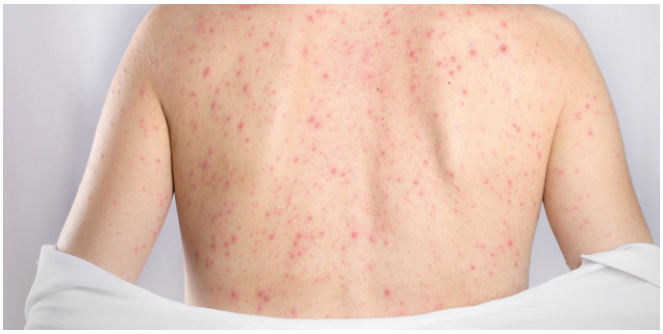
- Stepwise increase in fever to 103°F–105°F
- Cough, coryza, conjunctivitis, Diarrhea 8% Otitis media 7% Pneumonia 6% Encephalitis 0.1% Seizures 0.6-0.7% Death 0.2% Based on 1985-1992 surveillance data
- Koplik spots (rash on mucous membranes)

Rash

- 2-4 days after prodrome, 14 -16 days after exposure
- Persists 5-6 days
- Begins on face and upper neck
- Maculopapular, becomes confluent
- Fades in order of appearance

Measles – Other Clinical Presentations

- Atypical Measles
- Modified Measles
- Hemorrhagic Measles



Measles – Complications	
Diarrhea	8%
Otitis media	7%
Pneumonia	6%
Encephalitis	0.1%
Seizures	0.6-0.7%
Death	0.2%
Subacute sclerosing panencephalitis (SSPE)	5 to 10 per million cases

Measles - Immunocompromised Patients

More severe and prolonged disease course in persons with T-cell deficiencies (e.g. certain leukemias, lymphomas, and acquired immunodeficiency syndrome [AIDS]).

May occur without the typical rash

Patients may shed virus for several weeks

Measles – Pregnant Patients

Pregnant patients have a higher risk of

- premature labor,
- spontaneous abortion,
- low-birth weight infants.

Birth defects (with no definable pattern of malformation) have been reported rarely, without confirmation that measles was the cause.

References:

1. Wallace G, Leroy Z. ***Measles Virus. Pp 209-229***: **In: Centers for Disease Control and Prevention, Epidemiology and Prevention of Vaccine-Preventable Diseases.** Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.
2. Hall V, Banerjee E, Kenyon C, et al: ***MMWR 2017;*** 66(27): 713-717.
3. ***https://www.cdc.gov/measles/lab-tools/index.html*** Accessed March 19, 2019.

The Warde Report

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