Measles
(Rubeola, red or hard measles)

Organism: RNA virus with 1 serotype, a member of the genus Morbillivirus and the Paramyxovirus family.

Incubation period: The incubation period of measles, from exposure to prodrome averages 10–12 days. From exposure to rash onset averages 14 days (range, 7–18 days).

Infectious period: From 1 day before the beginning of the prodromal period, (which is about 4 days before the rash appears), until 4 days after the appearance of the rash; minimal after the second day of the rash.

Transmission route: Airborne by direct droplet spread, direct contact with nasal or throat secretions of infected persons; less commonly by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.

Treatment: Comfort measures. Exclude from childcare, school, work for 4 days prior to rash until 4 days after onset of rash.

Information Needed for the Investigation

Verify the Diagnosis
- Is there a history of prodromal symptoms: temperature of 101°F or higher, cough, coryza, conjunctivitis, and an erythematous maculopapular rash lasting 3 days or more? Are there small spots with white or bluish white centers on an erythematous base on the buccal mucosa (Koplik spots)?

Determine the Extent of Illness
- Request a digital photo of the rash.
- Determine immunization status, recent travel, or other sites of potential exposure.
- Develop a line list of close contacts and their immunization status.
- Check if patient attends school, childcare, work, and has participated in other social activities. Instruct to stay home until 5th day after rash onset.
- Notify the Regional Nurse Manager, the local Public Health Nurse, healthcare provider, or infection control person (ICP) and the Immunization Program Manager.

Laboratory Specimens
- Measles PCR is the method of choice for rapid clinical diagnosis at Alaska State Virology Laboratory (ASVL) (Table 1). EPI should advise ASVL of suspected measles case and incoming specimens.
  o Preferred specimens are throat or nasopharyngeal swabs using a Dacron® swab. Place swab in a tube containing universal transport media (UTM) and ship to ASVL on cool packs. Urine (raw) may also be submitted for PCR testing. ASVL will send these specimens to a CDC contract lab for PCR testing.

Updated 4/17/14
Please note that serum for IgM is only acceptable if it accompanies one of the previously mentioned sample types. If blood is collected, use a regular clot tube with no additives (red top or tiger top with serum separator).

- IgG antibody testing for immunity is available at ASVL.

- Clinicians who send specimens for testing at commercial laboratories should consult the commercial labs for specimen collection guidance.

Table 1. Specimens for measles testing submitted to ASVL

<table>
<thead>
<tr>
<th>Test</th>
<th>Rubeola (Measles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing Lab</td>
<td>Fairbanks</td>
</tr>
<tr>
<td>Disease(s)</td>
<td>Measles, Rubeola</td>
</tr>
<tr>
<td>Organism(s)</td>
<td>Rubeola Virus</td>
</tr>
</tbody>
</table>
| Test Method | Serology (Rubeola IgG Antibody)  
  1. This test is used to determine immune status.  
  2. The test is performed at ASVL by EIA.  
  PCR (Rubeola Virus Antigen)  
  1. This test is used to determine active infection.  
  2. Testing will be performed at a CDC contract lab. |
| Specimen | Serology  
  1. Serum (1 ml minimum)  
  PCR  
  1. Throat Swab (TS)  
  2. Nasopharyngeal Swab (NP) |
| Storage/Transport | Serology  
  1. Ship serum at ambient temp or on cool packs (4°C).  
  PCR  
  1. Ship inoculated UTM to ASVL on cool packs (4°C).  
  2. ASVL will overnight the sample to the CDC Contract Lab. |
| Results | Serology  
  1. Negative  
  - No significant level of detectable antibody.  
  - Presumed to be susceptible to primary infection.  
  2. Equivocal = a borderline result  
  - Result falls w/in ±10% of the positive threshold.  
  - Resubmission may be indicated.  
  3. Positive  
  - Indicates immunity by vaccination or infection.  
  PCR  
  1. Negative  
  - Antigen to the Rubeola Virus was not detected.  
  - No sign of active infection.  
  2. Positive  
  - Antigen to the Rubeola Virus was detected.  
  - Presence of antigen indicates an active infection. |
| Turnaround Time | Serology: 2-3 days from date of receipt at ASVL.  
  PCR: 2 days from date of receipt at CDC Contract Lab. |


Contact and Control Measures

- Contacts born before 1957 are considered immune by disease.
- Isolate suspect 4 days prior to rash until 4 days after onset of rash and susceptible contacts on day 5-21 post-exposure.
• Vaccinate those persons who are unvaccinated with 2 doses of MMR, 4 weeks apart. If given within 72 hours of exposure can provide protection.

• Pregnant women and immunocompromised individuals who have been exposed need to be referred to their healthcare provider.

• Immune Globulin (Human) may be used within 6 days of exposure for susceptible household or other high-risk individuals (such as those < 12 months old).

NOTE: For most persons >= 12 months who are exposed to measles, use of MMR or measles vaccine within 72 hours of exposure is preferred to using immune globulin (except pregnant women and others for whom the vaccine is contraindicated). Any person exposed to measles who lacks evidence of measles immunity and to whom immune globulin (IG) is administered should subsequently receive MMR vaccine but not earlier than 3 months after IG administration (provided the vaccine is not contraindicated).

Immune Globulin (Human) G is available at the SOE Depot. [http://www.talecris- pi.info/inserts/gamastans-d.pdf](http://www.talecris-pi.info/inserts/gamastans-d.pdf)

Hospital Considerations

• Airborne Precautions for four days after the onset of rash or duration of illness in immunocompromised patients.

• Susceptible Health Care Workers (HCWs) should not enter the room if immune HCWs are available.

• No recommendation is available for personal protective equipment (i.e. masks) considered effective in protecting susceptible HCWs.

• See contact and control measures above for vaccination recommendations and use of IG.

• Exclude susceptible and exposed HCWs from duty starting on day 5 after first exposure to day 21 after last exposure, regardless of post exposure vaccine.

Reporting Requirements

• Measles requires notification to CDC EOC at 770-488-7100 within 24 hours of confirmation.

• FTR: write up all confirmed cases.

• AK-STARS: enter all suspect, probable and confirmed cases.

• CDC Case Definition is used to define suspect, probable and confirmed cases.

Resources


Chapter 7: Measles--Manual for Surveillance of Vaccine-Preventable Diseases--“Pink Book”

CDC Measles Homepage

Updated 4/17/14
Measles (Rubeola)
2010 Case Definition
CSTE Position Statement Number: 09-ID-48

Case classification
Suspected: any febrile illness that is accompanied by rash and that does not meet the criteria for probable or confirmed measles or any other illness.

Probable:
- In the absence of a more likely diagnosis, an illness characterized by:
  - generalized rash lasting ≥3 days; and
  - temperature ≥101°F or 38.3°C; and
  - cough, coryza, or conjunctivitis; and
- no epidemiologic linkage to a confirmed case of measles; and
- noncontributory or no serologic or virologic testing.

Confirmed:
- Laboratory confirmation by any of the following:
  - positive serologic test for measles immunoglobulin M antibody;
  - significant rise in measles antibody level by any standard serologic assay;
  - isolation of measles virus from a clinical specimen; or
  - detection of measles-virus specific nucleic acid by polymerase chain reaction
- Note: A laboratory-confirmed case does not have to have generalized rash lasting ≥3 days; temperature ≥101°F or 38.3°C; cough, coryza, or conjunctivitis.

OR
- An illness characterized by:
  - generalized rash lasting ≥3 days; and
  - temperature ≥101°F or 38.3°C; and
  - cough, coryza, or conjunctivitis; and
  - epidemiologic linkage to a confirmed case of measles.

Epidemiologic Classification of Internationally-Imported and U.S-Acquired
Internationally imported case: An internationally imported case is defined as a case in which measles results from exposure to measles virus outside the United States as evidenced by at least some of the exposure period (7–21 days before rash onset) occurring outside the United States and rash onset occurring within 21 days of entering the United States and there is no known exposure to measles in the U.S. during that time. All other cases are considered U.S.-acquired. U.S.-acquired case: An U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 21 days before rash onset or was known to have been exposed to measles within the United States. U.S.-acquired cases are subclassified into four mutually exclusive groups:
- Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.
**Imported-virus case:** a case for which an epidemiologic link to an internationally imported case was not identified, but for which viral genetic evidence indicates an imported measles genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any measles virus that occurs in an endemic chain of transmission (i.e., lasting ≥12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

**Endemic case:** a case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of measles virus transmission that is continuous for ≥12 months within the United States.

**Unknown source case:** a case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Note: Internationally imported, import-linked, and imported-virus cases are considered collectively to be import-associated cases.

States may also choose to classify cases as “out-of-state-imported” when imported from another state in the United States. For national reporting, however, cases will be classified as either internationally imported or U.S.-acquired.

**See also:**

- [2009 Case Definition](#)
- [2007 Case Definition](#)
- [1996 Case Definition](#)
- [1990 Case Definition](#)
# Measles Surveillance Worksheet

## Appendix 8

<table>
<thead>
<tr>
<th>Name (Last, First)</th>
<th>Hospital Record No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address (Street and No.)</td>
<td>City</td>
</tr>
<tr>
<td>Reporting Physician/Nurse/Hospital/Clinic/Lab</td>
<td>Address</td>
</tr>
</tbody>
</table>

---

## Reporting Physician/Nurse/Hospital/CLinic/Lab Address Phone

---

## NAME (Last, First) Hospital Record No.

---

## Birth Date

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Age Type

| 0 = 0-120 years | 1 = 0-11 months | 2 = 0-52 weeks | 3 = 0-28 days | 9 = Age unknown |

---

## Age

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Ethnicity

| H = Hispanic | N = Not Hispanic | U = Unknown |

---

## Race

| N = Native Amer./Alaskan Native | W = White | O = Other | U = Unknown |

---

## Sex

| M = Male | F = Female | U = Unknown |

---

## Event Date

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Event Type

| 1 = Onset Date | 2 = Diagnosis Date | 4 = Reported to County |

---

## Outbreak Associated

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Informed

| 0 = 0-120 years | 1 = 0-11 months | 2 = 0-52 weeks | 3 = 0-28 days | 9 = Age unknown |

---

## Other Complications?

| Y = Yes | N = No | U = Unknown |

---

## Was Laboratory Testing For Measles Done?

| Y = Yes | N = No | U = Unknown |

---

## Date IgM Specimen Taken

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Result

| P = Positive | E = Pending | I = Indeterminate | U = Unknown |

---

## Date IgG Convalescent Specimen Taken

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Other Lab Result

| P = Positive | E = Pending | I = Indeterminate | U = Unknown |

---

## Date First Reported to a Health Department

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Year</th>
</tr>
</thead>
</table>

---

## Transmission Setting (Where did this case acquire measles?)

| 1 = Day Care | 6 = Hospital Outpatient Clinic | 11 = Military |

---

## Were Age and Setting Verified?

| Y = Yes | N = No | U = Unknown |

---

## Outbreak Related? If Yes, Outbreak Name

| Y = Yes | N = No | U = Unknown |

---

## Source of Exposure For Current Case

(Enter State ID if source was an in-state case; enter Country if source was out of US; enter State if source was out-of-state)

---

## Epi-Linked To Another Confirmed or Probable Case?

| Y = Yes | N = No | U = Unknown |

---

## Is Case Traceable Within 2 Generations to an International Import?

| Y = Yes | N = No | U = Unknown |
Activity History For 18 Days Before Rash Onset and 7 Days After Rash Onset

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day -18</td>
<td></td>
</tr>
<tr>
<td>Day -17</td>
<td></td>
</tr>
<tr>
<td>Day -16</td>
<td></td>
</tr>
<tr>
<td>Day -15</td>
<td></td>
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<tr>
<td>Day -14</td>
<td></td>
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<td>Day -13</td>
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<tr>
<td>Day -12</td>
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<tr>
<td>Day -11</td>
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<tr>
<td>Day -10</td>
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<tr>
<td>Day -9</td>
<td></td>
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<tr>
<td>Day -8</td>
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<tr>
<td>Day -7</td>
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<tr>
<td>Day -6</td>
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<tr>
<td>Day -5</td>
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<tr>
<td>Day -4</td>
<td></td>
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<tr>
<td>Day -3</td>
<td></td>
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<tr>
<td>Day -2</td>
<td></td>
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<tr>
<td>Day -1</td>
<td></td>
</tr>
<tr>
<td>Day 0 (Rash Onset)</td>
<td></td>
</tr>
<tr>
<td>Day 1</td>
<td></td>
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<tr>
<td>Day 2</td>
<td></td>
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<tr>
<td>Day 3</td>
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<tr>
<td>Day 4</td>
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<tr>
<td>Day 5</td>
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<tr>
<td>Day 6</td>
<td></td>
</tr>
<tr>
<td>Day 7</td>
<td></td>
</tr>
</tbody>
</table>

Clinical Case Definition*:
A generalized rash lasting ≥ 3 days, a temperature ≥ 101.0° F (≥38.3° C), and cough, coryza, or conjunctivitis.

Case Classification*:
Suspected: Any febrile illness accompanied by rash.
Probable: A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed case.
Confirmed: A case that is laboratory confirmed or 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.
Measles Fact Sheet  
(rubeola, red or hard measles)

What is measles?
Measles is a highly contagious rash illness caused by a virus of the genus *Morbillivirus* in the *Paramyxovirus* family. Complications from measles such as ear infections, pneumonia, croup, encephalitis, seizures, and death can occur.

How do you get it?
Anyone who has not had measles previously or who has not received the vaccine can get measles. Direct exposure to secretions from the nose or throat of a person with the disease can cause measles. Transmission occurs when a person with measles coughs or sneezes and airborne droplets are in the air for another person to breathe. Airborne transmission can occur for up to 2 hours after a person with measles has been in a closed area. It spreads rapidly and easily.

What are the symptoms of measles?
The symptoms usually occur in 2 stages. The first stage commonly begins with a runny nose, red watery eyes, fever, and cough. A red blotchy rash appears in the second stage, starting on the face and spreading down the body to the arms and legs and usually lasts for about 4-6 days.

When do symptoms start?
The fever, runny nose, and cough usually appear 10 days after exposure, but can appear as late as 18 days after exposure. The rash appears 3 to 7 days after the onset of the first symptoms.

When and for how long is a person able to spread measles?
Measles can be spread from one day before the onset of cold-like symptoms through the fourth day of the rash.

What is the treatment for measles?
There is no specific treatment for measles. Rest and symptomatic treatment is best for uncomplicated cases.

Should a person with measles be excluded from work or school? Yes, for 4 days after the onset of the rash.

If you get measles once, can you get it again?
No. Adults born before 1957 are usually immune because they had measles as a child.

How can you keep from getting it?
Measles vaccine (in the form of MMR or MR or measles only vaccines) can prevent measles.