

12-ID-07

Committee: Infectious Disease

Title: Public Health Reporting and National Notification for Measles

I. Statement of the Problem

In the setting of measles elimination in the United States, the current measles case definition lacks specificity.

II. Background and Justification

The current measles case definition defines as a confirmed case, any patient with a positive serologic test for IgM antibody.

In the United States, commercially available indirect enzyme immunoassay kits (EIA) for immunoglobulin M (IgM)-class antibodies are frequently used to test suspect measles cases. However, because measles has been eliminated in the United States and there are few true measles cases, the positive predictive value of these diagnostic tests has decreased. False-positive results of IgM tests can also occur as a result of testing suspected measles cases with exanthem caused by parvovirus B19, rubella and human herpesvirus 6, and other viruses. In addition, because the United States maintains high levels of vaccination activity and conducts surveillance for febrile rash illnesses, the notification of febrile rash illness in recently vaccinated people is likely to occur.

Thus, public health departments may need to address the interpretation of a positive result of a laboratory test for measles IgM when clinical and epidemiological data may indicate that the case is not measles.

Revising the case definition will assist public health departments conducting measles case investigations and reduce the number of falsely positive suspect measles cases reported as confirmed cases.

III. Statement of the desired action(s) to be taken

CSTE requests that CDC adopt this revised, standardized reporting definition for measles, including the following changes:

1. Add clinical description.
2. Delete suspect case classification.
3. Modify probable case classification.
4. Modify confirmed case classification.

IV. Goals of Surveillance

To rapidly identify and contain any measles importations into the United States and any sustained chains of transmission of measles.

V. Methods for Surveillance: Surveillance for measles should use the following recommended sources of data and the extent of coverage listed in Table V.

Surveillance for measles should use the sources of data and the extent of coverage listed in Table V.

Table V. Recommended sources of data for case identification and extent of coverage for ascertaining cases of measles.

Source of data for case identification	Coverage	
	Population-wide	Sentinel sites
Clinician reporting	X	
Laboratory reporting	X	
Reporting by other entities (e.g., hospitals, veterinarians, pharmacies)	X	
Death certificates	X	
Hospital discharge or outpatient records	X	
Extracts from electronic medical records	X	
Telephone survey		
School-based survey		
Other		

VI. Criteria for Reporting

A. Narrative: A description of suggested criteria that may be used for case ascertainment of a specific condition.

Report any illness to public health authorities that meets any of the following criteria:

1. Acute illness with fever and rash in a person with any of the epidemiological linkages listed below:
 - a. Contact of a confirmed measles case
 - b. Belonging to a defined risk group during an outbreak
 - c. Residence in a geographic area of the US where an outbreak of measles is occurring
 - d. Travel during past 21 days to a geographic area where measles is endemic or an outbreak of measles is occurring
2. Acute illness with fever and rash in a person for whom any of the laboratory tests listed below has been ordered:
 - a. Culture measles virus
 - b. PCR, measles-specific nucleic acid
 - c. Measles IgM antibody
 - d. Acute and convalescent anti-measles IgG antibodies
3. Acute illness with fever $\geq 101^{\circ}\text{F}$ and generalized, maculopapular rash in a person for whom there is not a more compelling diagnosis.

Other recommended reporting procedures

- All cases of measles should be reported.
- Reporting should be on-going and routine.
- Reporting should be immediate.

B. Table of criteria to determine whether a case should be reported to public health authorities

Table VI-B. Table of criteria to determine whether a case should be reported to public health authorities.

Criterion			
<i>Clinical Evidence</i>			
Fever (any)	N	N	
Rash (any)	N	N	
Temperature $\geq 101^{\circ}\text{F}/38.3^{\circ}\text{C}$			N
Generalized, maculopapular rash			N
Absence of a more likely diagnosis			N
<i>Laboratory Evidence</i>			
Culture measles virus		O*	
PCR test for measles-specific nucleic acid		O*	
Measles IgM antibody		O*	
Acute and convalescent anti-measles IgG antibodies		O*	
<i>Epidemiological Evidence</i>			
Contact of a confirmed measles case	O		
Belonging to a defined risk group during an outbreak	O		
Residence in a geographic area where measles is endemic or an outbreak of measles is occurring	O		
Travel during past 21 days to a geographic area where measles is endemic or an outbreak of measles is occurring	O		

Notes:

S = This criterion alone is Sufficient to report a case.

N = All “N” criteria in the same column are Necessary to report a case.

O = At least one of these “O” (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to report a case.

* A requisition or order for any of the “O” laboratory tests—in conjunction with all “N” criteria in the same column—is sufficient to meet the reporting criteria.

C. Disease-specific data elements

Clinical information

Date of onset, fever

Date of onset, rash

Epidemiological risk factors

Contact with measles case

Destination(s) of recent travel, if any

Date of return from travel

Total doses of measles-containing vaccine

Date of last measles vaccination

VII. Case Definition for Case Classification

A. Narrative: Description of criteria to determine how a case should be classified.

Changes noted in §III and §VI.A above. See also below.

Clinical description:

- An acute illness characterized by:
 - Generalized, maculopapular rash lasting ≥ 3 days; **and**
 - temperature $\geq 101^\circ\text{F}$ or 38.3°C ; **and**
 - cough, coryza, or conjunctivitis.

Probable:

- In the absence of a more likely diagnosis, an illness that meets the clinical description with:
 - no epidemiologic linkage to a laboratory-confirmed measles case; **and**
 - noncontributory or no measles laboratory testing.

Confirmed:

- An acute febrile rash illness[†] with:
 - isolation of measles virus[‡] from a clinical specimen; **or**
 - detection of measles-virus specific nucleic acid[‡] from a clinical specimen using polymerase chain reaction; **or**
 - IgG seroconversion[‡] or a significant rise in measles immunoglobulin G antibody[‡] using any evaluated and validated method; **or**
 - a positive serologic test for measles immunoglobulin M antibody^{‡§}; **or**
 - direct epidemiologic linkage to a case confirmed by one of the methods above.

[†] Temperature does not need to reach $\geq 101^\circ\text{F}/38.3^\circ\text{C}$ and rash does not need to last ≥ 3 days.

[‡] Not explained by MMR vaccination during the previous 6-45 days.

[§] Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

Note:

CDC does not request or accept reports of suspect cases so this category is no longer needed for national reporting purposes.

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.

B. Classification Tables

Table VII-B. Criteria for defining a case of measles.

Criterion	Confirmed		Probable
<i>Clinical Evidence</i>			
Generalized, maculopapular rash lasting ≥ 3 days			N
Temperature $\geq 101^\circ\text{F}/38.3^\circ\text{C}$			N
Fever (any)	N	N	
Rash (any)	N	N	
Cough			O
Coryza			O
Conjunctivitis			O
Absence of a more likely diagnosis			N
<i>Laboratory Evidence</i>			
Measles virus [†] from a clinical specimen	O		
PCR test for measles-specific nucleic acid [†]	O		
Measles immunoglobulin G antibody seroconversion [†] or significant rise in measles immunoglobulin G antibody [†] using a validated method	O		
Measles IgM antibody ^{†§}	O		



<i>Epidemiological Evidence</i>			
Direct epidemiologic linkage to a laboratory-confirmed case		N	A

Notes:

S = This criterion alone is Sufficient to classify a case.

N = All “N” criteria in the same column are Necessary to classify a case. A number following an “N” indicates that this criterion is only required for a specific disease/condition subtype (see below).

O = At least one of these “O” (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to classify a case.

A = This criterion must be absent (i.e., NOT present) for the case to meet the reporting criteria.

‡ Not explained by MMR vaccination during the previous 6-45 days.

§Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

VIII. Period of Surveillance

Surveillance should be ongoing.

IX. Data sharing/release and print criteria

Notification to CDC for confirmed cases of measles is recommended.

Data reported to NCIRD staff is summarized weekly internally via an NCIRD weekly surveillance report for vaccine preventable diseases. Electronic reports of measles cases in NNDSS are also summarized weekly in the MMWR Tables. However, because of delays in data entry and data transmission via NNDSS, these two data sources may not correspond. Annual case data on measles is also summarized in the yearly Summary of Notifiable Diseases. Cumulative data is used for Healthy People 2010 reviews.

- State-specific compiled data will continue to be published in the weekly and annual MMWR. In addition to those reports, the frequency of reports/feedback to the states and territories will be dependent on the current epidemiologic situation in the country. Frequency of cases, epidemiologic distribution, importation status, transmission risk, and other factors will influence frequency and method of communication and information feedback. For example, during 2008, because of the higher than expected number of cases and some of their unusual epidemiologic characteristics, we have already summarized and published 2008 measles case data in three separate MMWR articles.
- State-specific compiled data will continue to be published in the weekly reports and annual MMWR Surveillance Summaries. All cases are verified with the state (s) before publication. Data are also included in PAHO and WHO annual reports The frequency of release of additional publication of this data will be dependent on the current epidemiologic situation in the country. These publications might include annual epidemiologic summaries in the MMWR or manuscripts in peer-reviewed journals.
- As part of an effort to document measles elimination in the Americas, we currently report data on all suspect cases of measles known to NCIRD to PAHO on a weekly basis. Information on sex, age, rash onset, vaccination status, genotype and source (import, import-associated etc.) is provided. No personal identifying or state specific information is re-released to PAHO or WHO.

X. References

Dietz V, Rota J, Izurieta H, Carrasco P, Bellini W. The laboratory confirmation of suspected measles cases in settings of low measles transmission: conclusions from the experience in the Americas. *Bull World Health Organ.* 2004 Nov;82(11):852-7. Epub 2004 Dec 14.

Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2623064/?tool=pubmed>

Centers for Disease Control and Prevention (CDC). National notifiable diseases surveillance system: case definitions for infectious conditions under public health surveillance. Atlanta: CDC. Available from:

http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/index.htm. Current measles case definition 2010: http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/measles_2010.htm. Accessed March 29, 2012.

Centers for Disease Control and Prevention (CDC). Case definitions for infectious conditions under public health surveillance. *MMWR* 1997;46(No. RR-10):1-57. Available from: <http://www.cdc.gov/mmwr/>.

Council of State and Territorial Epidemiologists (CSTE). CSTE official list of nationally notifiable conditions. CSTE position statement 07-EC-02. Atlanta: CSTE; June 2007. Available from: <http://www.cste.org>.

Heymann DL, editor. *Control of communicable diseases manual*. 19th edition. Washington: American Public Health Association; 2008.

Council of State and Territorial Epidemiologists (CSTE). Criteria for inclusion of conditions on CSTE nationally notifiable condition list and for categorization as immediately or routinely notifiable. CSTE position statement 08-EC-02. Atlanta: CSTE; June 2008. Available from: <http://www.cste.org>.

Council of State and Territorial Epidemiologists, Centers for Disease Control and Prevention. CDC-CSTE Intergovernmental Data Release Guidelines Working Group (DRGWG) Report: CDC-ATSDR Data Release Guidelines and Procedures for Re-release of State-Provided Data. Atlanta: CSTE; 2005.

Available from: <http://www.cste.org/pdffiles/2005/drgwgreport.pdf> or <http://www.cdc.gov/od/foia/policies/drgwg.pdf>.

Gershon AA. Measles Virus (Rubeola). In: Mandell GL, Bennett JE, Dolin R, editors. *Principles and Practice of Infectious Diseases*, 6th edition. Philadelphia: Churchill Livingstone; 2005.

Orenstein WA, Papania MJ, Wharton ME. Measles elimination in the United States. *J Infect Dis.* 2004;189 Suppl 1:S1-3.

XI. Coordination

Agencies for Response

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