

MEASLES

Includes Confirmed and Possible Cases

Background

This case definition was developed by the Armed Forces Health Surveillance Center (AFHSC) for the purpose of epidemiological surveillance of measles in military-associated populations. The methodology used in this case definition captures cases of confirmed measles and attempts to identify individuals that may have had measles, (i.e., “possible” cases of measles). Examination of possible cases revealed that measles recorded in health records often represents misdiagnoses, tentative “rule out” diagnoses, or miscodings of encounters for vaccinations or laboratory testing. Restrictive case finding criteria are used to focus on “confirmed” cases. The AFHSC encourages the cautious interpretation of data about “possible” cases of measles, given the uncertainty about the specificity of the case definition.

Clinical Description

Measles, or rubeola, is a highly communicable viral disease that spreads through respiratory droplets in the air or by contact with contaminated surfaces. The clinical course begins with mild nonspecific symptoms (fever, cough, runny nose, conjunctivitis, sore throat) lasting 2–3 days; white spots (Koplik spots) may appear on the buccal mucosa inside the mouth. This stage is followed by the development of a maculopapular rash and a high fever. Complications of measles occur in about one-third of cases and can include ear infection, inflammation of the respiratory tract, encephalitis, and thrombocytopenia. The virus is particularly dangerous for unvaccinated pregnant women because of the risk of pregnancy loss and preterm labor. With one dose, the vaccine is 93% effective, with two doses it is 97% effective.¹ Vaccination is required for entry into military service.²

Case Definition and Incidence Rules

For surveillance purposes, a *confirmed* case of measles is defined as:

- One record of a reportable medical event *with* laboratory or epidemiological confirmation.

For surveillance purposes, a *possible* case of measles is defined as:

- One record of a reportable medical event of measles *without* laboratory or epidemiological confirmation; or
- *One hospitalization or outpatient medical encounter* with any of the defining diagnoses of a *possible* case of measles (see ICD9 and ICD10 code lists below) in the *primary* diagnostic position; *plus* a “measles associated symptom” (see ICD9 and ICD10 code lists below) in *any* other diagnostic position.

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¹ Measles (Rubeola): Frequently Asked Questions about Measles in the U.S., Centers for Disease Control and Prevention (CDC), <http://www.cdc.gov/measles/about/faqs.html>

² Armed Forces Health Surveillance Center. Measles and Mumps Among Service Members and Other Beneficiaries of the US Military Health System, January 2007-December 2014. *Medical Surveillance Monthly Report (MSMR)*; 2015 February; Vol 22(2): 14-18.



Case Definition and Incidence Rules (cont.)

Incidence rules:

For individuals who meet the case definition:

- The incidence date is considered the date of onset documented in a reportable medical event report, or the first hospitalization or outpatient medical encounter that includes a defining diagnosis of measles.
- An individual is considered an incident case only *once per lifetime*

Exclusions (applies to possible cases of measles only):

- Cases with *one* medical encounter with evidence of measles immunization *within 7 days* before or after the case-defining encounter; as indicated by the following vaccine administered (CVX) codes: 003 (MMR), 004 (M/R), 005 (measles), 094 (MMRV).
- Individuals with evidence of a positive test for serologic immunity to measles *within 7 days* before or after the case defining encounter.
- Cases with *one* Current Procedure Code (CPT) or *one* ICD9/ICD10 procedure code indicating measles vaccination or antibody testing recorded during the *same* medical encounter; as indicated by the following codes.
 - ICD9 codes: V04.89 (other viral diseases), V04.2 (measles alone), and V04.3 (rubella alone), and V04.6 (mumps alone), and V04.8 (other viral diseases), V05.8 (other specified disease) V05.9 (unspecified single disease), V06.4 (measles-mumps-rubella [MMR]), V06.8 (other combinations), and V06.9 (unspecified combined vaccine), V73.2 (measles), 99.45 (measles vaccine), (98.48 (MMR), and 99.46 (mumps vaccine). In ICD10 use Z23 (encounter for immunization) plus procedure code for type of immunization.
 - CPT codes: 86765 (measles IgG or IgM), 86735 (mumps antibody panel), 86762 (MMR IgG), 87798 (mumps virus RNA PCR), 96372 (therapeutic, prophylactic, or diagnostic injections), 90772 (therapeutic, prophylactic, or diagnostic injections), 90704 (mumps virus vaccine), 90705 (measles virus vaccine), 90707 (MMR vaccine), 90708 (measles and rubella vaccine), 90709 (rubella and mumps vaccine), and 90710 (MMRV vaccine)

Codes

The following ICD9 and ICD10 codes are included in the case definition:

Condition	ICD-10-CM Codes	ICD-9-CM Codes
Measles	--	055 (measles) <i>(continued on next page)</i>



<i>(Possible case)</i>	B05.0 (measles complicated by encephalitis)	055.0 (post measles encephalitis)
	B05.1 (measles complicated by meningitis)	055.79 (measles with other specified complication; other)
	B05.2 (measles complicated by pneumonia)	055.1 (post measles pneumonia)
	B05.4 (measles with intestinal complications)	055.79 (above)
	B05.8 (measles with other complications)	055.7 (measles with other specified complication)
	- B05.89 (other measles complications)	055.79 (above) 055.8 (measles with unspecified complication)
	B05.9 (measles without complications)	055.9 (measles without mention of complication)

Symptoms	ICD-10-CM Codes	ICD-9-CM Codes
Measles associated symptoms	B09 (unspecified viral infection characterized by skin and mucous membrane lesions)	057.9 (viral exanthema, unspecified)
	B30.9 (viral conjunctivitis, unspecified)	077.9 (unspecified diseases of conjunctiva due to viruses and chlamydia) 077.99 (unspecified diseases of conjunctiva due to viruses)
	H10.01 (acute follicular conjunctivitis)	372.0x (acute conjunctivitis) 372.02 (acute follicular conjunctivitis)
	- H10.011 (... right eye)	
	- H10.012 (... left eye)	
	- H10.013 (... bilateral)	
	- H10.019 (... unspecified eye)	
	H10.02 (other mucopurulent conjunctivitis)	372.03 (other mucopurulent conjunctivitis)
	- H10.021 (... right eye)	
	- H10.022 (... left eye)	
	- H10.023 (... bilateral)	
	- H10.029 (... unspecified eye)	
	H10.1 (acute atopic conjunctivitis)	372.05 (acute atopic conjunctivitis)
	- H10.10 (... unspecified eye)	
	- H10.11 (... right eye)	
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- H10.12 (... left eye)	
- H10.13 (... bilateral)	
H10.2 (other acute conjunctivitis)	--
H10.22 (pseudomembranous conjunctivitis)	372.04 (pseudomembranous conjunctivitis)
- H10.221 (... right eye)	
- H10.222 (... left eye)	
- H10.223 (... bilateral)	
- H10.229 (... unspecified eye)	
H10.23 (serous conjunctivitis, except viral)	372.01 (serous conjunctivitis, except viral)
- H10.231 (... right eye)	
- H10.232 (... left eye)	
- H10.233 (... bilateral)	
- H10.239 (... unspecified eye)	
H10.3 (unspecified acute conjunctivitis)	372.00 (acute conjunctivitis, unspecified)
- H10.30 (... unspecified eye)	
- H10.31 (... right eye)	
- H10.32 (... left eye)	
- H10.33 (... bilateral)	
H10.8 (other conjunctivitis)	372.3x (other and unspecified conjunctivitis)
H10.89 (other conjunctivitis)	372.30 (conjunctivitis, unspecified)
H10.9 (unspecified conjunctivitis)	372.33 (conjunctivitis in mucocutaneous disease) 372.39 (other conjunctivitis)
J00 (acute nasopharyngitis; common cold)	460 (acute nasopharyngitis; common cold)
<i>J01 (acute sinusitis) – does not include recurrent</i>	461 (acute sinusitis)
J01.0 (acute maxillary sinusitis)	461.0 (acute maxillary sinusitis)
- J01.00 (acute maxillary sinusitis unspecified)	
J01.1 (acute frontal sinusitis)	461.1 (acute frontal sinusitis)
- J01.10 (acute frontal sinusitis unspecified)	

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J01.2 (acute ethmoidal sinusitis)	461.2 (acute ethmoidal sinusitis)
J01.20 (acute ethmoidal sinusitis <i>unspecified</i>)	
J01.3 (acute sphenoidal sinusitis)	461.3 (acute sphenoidal sinusitis)
- J01.30 (acute sphenoidal sinusitis <i>unspecified</i>)	
J01.4 (acute pansinusitis)	461.8 (other acute sinusitis)
- J01.40 (acute pansinusitis <i>unspecified</i>)	
J01.8 (other acute sinusitis)	
- J01.80 (other acute sinusitis)	
J01.9 (acute sinusitis, unspecified)	461.9 (acute sinusitis, unspecified)
- J01.90 (acute sinusitis, unspecified)	
J02.9 (acute pharyngitis, unspecified)	462 (acute pharyngitis)
J03.9 (acute tonsillitis, unspecified)	463 (acute tonsillitis)
- J03.90 (acute tonsillitis, unspecified)	
<i>J04 (acute laryngitis and tracheitis)</i>	464 (acute laryngitis and tracheitis)
J04.0 (acute laryngitis)	464.0 (acute laryngitis) 464.00 (acute laryngitis, without mention of obstruction)
J04.1 (acute tracheitis)	464.1 (acute tracheitis)
- J04.10 (acute tracheitis without obstruction)	464.10 (acute tracheitis, without mention of obstruction)
- J04.11 (acute tracheitis with obstruction)	464.11 (acute tracheitis, with obstruction)
J04.3 (supraglottitis, unspecified)	464.5 (supraglottitis, unspecified)
- J04.30 (supraglottitis, unspecified, without obstruction)	464.50 (supraglottitis, without mention of obstruction)
- J04.31 (supraglottitis, unspecified, with obstruction)	464.51 (supraglottitis, with obstruction)
<i>J05 (acute obstructive laryngitis [croup] with epiglottitis)</i>	--
J05.0 (acute obstructive laryngitis; croup)	464.2 (acute laryngotracheitis) - 464.01 (acute laryngitis, with obstruction) - 464.21 (acute laryngotracheitis, with obstruction) - 464.4 (croup)

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J05.1 (acute epiglottitis)	464.3 (acute epiglottitis)
- J05.10 (acute epiglottitis without obstruction)	464.30 (acute epiglottitis, without mention of obstruction)
- J05.11 (acute epiglottitis with obstruction)	464.31 (acute epiglottitis, with obstruction)
<i>J06 (acute upper respiratory infections of multiple and unspecified site)</i>	465 (acute upper respiratory infections of multiple and unspecified sites)
J06.0 (acute laryngopharyngitis)	465.0 (acute laryngopharyngitis)
J06.9 (acute upper respiratory infection, unspecified)	465.8 (acute upper respiratory infection of other multiple sites) 465.9 (unspecified site)
J12.89 (other viral pneumonia)	480.8 (pneumonia due to other virus not elsewhere classified)
J12.9 (viral pneumonia, unspecified)	480.9 (viral pneumonia, unspecified)
J16.8 (pneumonia due to other specified infectious organisms)	483.8 (pneumonia due to other specified organism)
J18.0 (bronchopneumonia, unspecified organism)	485 (bronchopneumonia, organism unspecified)
J18.9 (pneumonia, unspecified organism)	486 (pneumonia, organism unspecified)
--	466 (acute bronchitis and bronchiolitis)
<i>J20 (acute bronchitis)</i>	--
J20.9 (acute bronchitis, unspecified) [Consider J20.0 –J20.8; acute bronchitis due to specific organism]	466.0 (acute bronchitis)
<i>J21 (acute bronchiolitis)</i>	466.1 (acute bronchiolitis)
- J21.0 (acute bronchiolitis due to respiratory syncytial virus)	466.11 (acute bronchiolitis due to respiratory syncytial virus, RSV)
- J21.8 (acute bronchiolitis due to other specified organisms)	466.19 (acute bronchiolitis due to other infectious organisms)
- J21.9 (acute bronchiolitis, unspecified)	
P39.1 (neonatal conjunctivitis and dacryocystitis)	771.6 (neonatal conjunctivitis and dacryocystitis)
P81.8 (other specified disturbances of temperature regulation of newborn)	778.4 (other disturbances of temperature regulation of newborn)
P81.9 (disturbance of temperature regulation of newborn, unspecified)	
R21 (rash and nonspecific skin eruption)	782.1 (rash and other nonspecific skin eruption)

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R50 (fever of other and unknown origin)	780.6 (fever and other physiologic disturbances of temperature regulation)
- R50.8 (other specified fever)	--
- R50.81 (fever presenting with conditions classified elsewhere)	780.61 (fever presenting with conditions classified elsewhere)
R50.9 (fever, unspecified)	780.60 (fever, unspecified)
R53 (malaise and fatigue)	780.7 (malaise and fatigue)
- R53.1 (weakness)	780.79 (other malaise and fatigue)
- R53.8 (other malaise and fatigue)	
- R53.81 (other malaise)	
- R53.83 (other fatigue)	

Development and Revisions

- This case definition for measles was developed in February 2015 by the Medical Surveillance Monthly Report (MSMR) staff for use in a MSMR article on measles and mumps.¹ The case definition was developed based on reviews of the ICD9 codes, the scientific literature, and previous AFHSC analyses.

Case Definition and Incidence Rule Rationale

- An RME with a diagnosis of measles characterized as “probable” or “suspected” and never amended as “confirmed” is treated as a “possible” case. As a result, “possible” cases may include both “true” cases for which there were no follow-up RMEs indicating confirmation; and “true” cases for which diagnoses were documented in inpatient or outpatient records but no RMEs were ever transmitted by local military public health officials.
- During the development of the case definition, analysis of numerous cases with a primary listed diagnosis of measles revealed that many of the cases were, in fact, not measles. In response, AFHSC restricted its case finding criteria for possible cases to include only those individuals with a medical encounter in the primary diagnostic position *and* an associated symptom of measles.
- A line-listing review of cases was used to determine the symptoms most commonly used and entered in the medical record with a primary diagnosis of measles. The resultant symptom list generated using his methodology may not reflect the symptoms most commonly associated with a clinical case of measles. As such, investigators using this case definition may want to consider an alternative list of symptoms.
- The vaccine exclusions used for the case definition apply only to “possible” cases of measles. The list of vaccine exclusions includes vaccination codes specific for, and related to, measles vaccination. Related vaccinations given during the same medical encounter as the measles diagnosis would cast doubt on the accuracy of the diagnosis.

Code Set Determination and Rationale

- ICD9 055.2 (post measles otitis media)/ICD 10 B05.3 (measles complicated by otitis media) and ICD9 055.71 (measles keratoconjunctivitis)/ICD10 B05.81 (measles keratitis and keratoconjunctivitis) are not included in the code set. A review of the cases indicated individuals with these ICD9 and ICD10 codes were not actual cases of measles.



Reports

AFHSC reports on measles in the following reports:

- Monthly: AFHSC Reportable Events Monthly Report. Available on the AFHSC website at: <http://www.afhsc.mil>; see “Reports and Publications”.

Review

May 2015	Case definition reviewed and adopted by the AFHSC Surveillance Methods and Standards (SMS) working group.
Feb 2015	Case definition developed by AFHSC MSMR staff.

Comments

Armed Forces Reportable Events: Measles is a reportable medical event in the Armed Forces Reportable Events surveillance system under “Vaccine Preventable” disease.

