11-ID-18

Committee: Infectious

Title: Public Health Reporting and National Notification for Mumps

I. Statement of the Problem

After the 2006 multi-state mumps outbreak, the mumps case definition was revised to 1) include acute mumps complications, 2) add a suspected case classification for state/local use only, 3) include newer laboratory tests, and 4) include import status for case classification. (http://www.cste.org/PS/2007ps/2007psfinal/ID/07-ID-02.pdf). This case definition went into effect in 2008.

Two large mumps outbreaks during 2009-2010 have identified challenges in the use and interpretation of the 2008 case definition and classification system. The main challenges with application of the 2008 case definition/classification include the following:

1) In the 2008 "confirmed" case classification, an individual needs to be symptomatic and either laboratory confirmed or epidemiologically linked to a confirmed case. However, if a person is epidemiologically linked to a confirmed case, nowhere does it state that laboratory confirmation is necessary in the direct epidemiological link or in the chain in order to be considered confirmed.

2) In the 2008 case classification, a probable case is defined as someone who meets the clinical case definition without laboratory confirmation and is epidemiologically linked to a clinically compatible case. However, almost all cases with whom a probable case is epidemiologically linked have parotitis, thereby meeting the clinical case definition (rather than the clinically compatible case definition). Since it is not explicitly stated that laboratory confirmation is necessary to be a confirmed case (see above), many cases that lacked laboratory confirmation (both the case him/herself and the cases with whom that individual is epidemiologically linked), and therefore should have been considered probable, were classified as confirmed.

3) In the 2008 case classification, there is currently not a classification for someone who is laboratory confirmed, is epidemiologically linked to a probable or confirmed case, but who has no mumps-specific symptoms.

4) In the 2008 case classification, two people with parotitis who attend the same school but were not known to have had direct contact would remain suspect cases. However, as the 2009-2010 outbreaks increased in size, state and local health departments routinely classified individuals with presumed epidemiological links in the same school or the same religious community as probable or confirmed cases.

5) Mumps laboratory diagnostics have improved since the writing of the 2008 case classification. There is a recognized difference in false-positive rates between serological and virological tests for mumps. The likelihood of obtaining a false-positive test result from a virological specimen is extremely low.

The case definition and classification proposed in this document address the challenges listed above.

II. Background and Justification

Background

Mumps is characterized by swelling of either one or both of the parotid glands lasting two or more days in duration. It may be accompanied by fever and swelling of the submandibular and sublingual glands. While typically self-limited and mild, complications of mumps may include aseptic meningitis, encephalitis, acute hearing loss, orchitis, oophoritis, mastitis and pancreatitis. Despite high immunization levels, the US has experienced three large outbreaks between 2006 and 2010 in populations highly vaccinated with two doses of measles-mumps-rubella (MMR) vaccine. The first of these outbreaks occurred in 2006 primarily among Midwestern college-aged students. The second outbreak occurred in 2009-2010 in Orthodox Jewish communities in the Northeast. The third outbreak occurred in 2009-2010 in the US Territory of Guam. The US mumps epidemics in the Midwest and the Northeast were preceded by several years of widespread disease in Europe, particularly the UK, where immunization rates are low. Surveillance of mumps is needed to detect and control outbreaks and to evaluate current prevention strategies.

Justification

There have been varying interpretations of the 2008 mumps case definition. The classification system proposed in this position statement seeks to clarify the original intent of the 2008 document and resolve challenges that were identified during the 2009-2010 outbreaks in the US, including Guam.

Mumps laboratory diagnostics have improved since the 2008 case classification system was implemented. The classification system proposed in this position statement seeks to acknowledge and strategically apply these improvements.

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

The modified case reporting criteria in Part VI-A and modified case classifications in Part VII will be implemented.

IV. Goals of Surveillance

To provide information on the temporal, geographic, and demographic occurrence of mumps to facilitate its prevention and control.

V. Methods for Surveillance

Surveillance for Mumps should use the sources of data and the extent of coverage listed in table V below.

Table V. Recommended sources of data and extent of coverage for ascertaining cases of Mumps.

	Coverage	
Source of data for case ascertainment	Population-wide	Sentinel sites
clinician reporting	X	
laboratory reporting	X	
reporting by other entities (e.g., hospitals)	X	
death certificates		
hospital discharge or outpatient records	X	
extracts from electronic medical records	X	
telephone survey		
school-based survey		
other _____		

VI. Criteria for Reporting

Reporting refers to the process of healthcare providers or institutions (e.g., clinicians, clinical laboratories, hospitals) submitting basic information to governmental public health agencies about cases of illness that meet certain reporting requirements or criteria. The purpose of this section is to provide those criteria to determine whether a specific illness should be reported.

A. **Narrative description of criteria to determine whether a case should be reported to public health authorities**

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

1. Acute illness characterized by parotitis (i.e., acute onset of unilateral or bilateral tender, self-limited swelling of the parotid) or other salivary gland(s), lasting at least 2 days.
2. Acute illness characterized by a mumps-associated complication (i.e., aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, mastitis or pancreatitis) in a person with any of the following epidemiologic risk factors for mumps:
    a. Contact with a confirmed mumps case
    b. Member of a risk group defined by public health authorities during an outbreak
3. Laboratory tests for acute mumps infection without clinical information.
    - Isolation of Mumps virus in cell culture
    - Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) test positive for mumps-specific nucleic acid
    - Mumps IgM antibody
    - Acute and convalescent anti-mumps IgG by quantitative assay
    - Standardized mumps serologic assay to determine seroconversion

Other recommended reporting procedures

All probable and confirmed cases of mumps should be reported.
Reporting should be on-going and routine.
Frequency of reporting should follow the state health department's routine schedule.

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. Requirements for reporting are established under State and Territorial laws and/or regulations and may differ from jurisdiction to jurisdiction. These criteria are suggested as a standard approach to identifying cases of this condition for purposes of reporting, but reporting should follow State and Territorial law/regulation if any conflicts occur between these criteria and those laws/regulations.

Criterion	Reporting		
Clinical Evidence			
Parotitis lasting at least 2 days	S		
Swelling of other salivary gland(s) lasting at least 2 days	S		
Aseptic meningitis		O	

Encephalitis		O	
Hearing Loss		O	
Orchitis		O	
Oophoritis		O	
Mastitis		O	
Pancreatitis		O	
Laboratory Evidence			
Isolation of Mumps virus in cell culture			O
Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) test positive for mumps-specific nucleic acid			O
Mumps IgM antibody			O
Acute and Convalescent anti-mumps IgG by quantitative assay			O
Standardized mumps serologic assay to determine seroconversion			O
Epidemiological risk Evidence			
Contact of a confirmed mumps case		O	
Member of a risk group defined by public health authorities during an outbreak.		O	

Notes:
S = This criterion alone is sufficient to report a case
O = At least one of these "O" criteria in each category in the same column (e.g., clinical presentation evidence and laboratory evidence) is required to report a case.

C. Disease Specific Data Elements:

Disease-specific data elements to be included in the initial report are listed below.

Clinical Presentation

- Parotitis or swelling of sublingual or submandibular salivary glands for 2 or more days
- Onset date of symptoms
- Mumps-associated complication (describe)

Epidemiological Evidence

- Contact (or in a chain of contacts) of a laboratory confirmed mumps case
- Contact of a person with parotitis
- Contact of a person with a mumps-associated complication
- Member of a risk group defined by public health authorities during an outbreak
- Return from international travel within 25 days of symptom onset
    - Travel location
    - Date of return to U.S.

Immunization History

- Number of doses of mumps-containing vaccine received
- Date of all doses of mumps-containing vaccine received

VII. Case Definition for Case Classification

A. Narrative description of criteria to determine whether a case should be classified as confirmed or probable (presumptive) or suspect is provided:

Suspect:

- Parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis,
  or
- A positive lab result with no mumps clinical symptoms (with or without epidemiological-linkage to a confirmed or probable case).

Probable:

- Acute parotitis or other salivary gland swelling lasting at least 2 days, or orchitis or oophoritis unexplained by another more likely diagnosis, in:
  - a person with a positive test for serum anti-mumps IgM antibody, or
  - a person with epidemiologic linkage to another probable or confirmed case or linkage to a group/community defined by public health during an outbreak of mumps.

Confirmed:

- A positive mumps laboratory confirmation for mumps virus with RT-PCR or culture in a patient with an acute illness characterized by any of the following:
  - Acute parotitis or other salivary gland swelling, lasting at least 2 days
  - Aseptic meningitis
  - Encephalitis
  - Hearing loss
  - Orchitis
  - Oophoritis
  - Mastitis
  - Pancreatitis

Case Classification for Import Status

Internationally imported case: An internationally imported case is defined as a case in which mumps results from exposure to mumps virus outside the United States as evidenced by at least some of the exposure period (12–25 days before onset of parotitis or other mumps-associated complications) occurring outside the United States and the onset of parotitis or other mumps-associated complications within 25 days of entering the United States and no

known exposure to mumps in the U.S. during that time. All other cases are considered U.S.-acquired cases.

U.S.-acquired case: A U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 25 days before onset of parotitis or other mumps-associated complications or was known to have been exposed to mumps within the United States.

U.S.-acquired cases are sub-classified 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 mumps 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 mumps 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 mumps virus transmission 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.**

Comment

With previous contact with mumps virus either through vaccination (particularly with 2 doses) or natural infection, serum mumps IgM test results may be negative; IgG test results may be positive at initial blood draw; and viral detection in RT-PCR or culture may have low yield if the buccal swab is collected too long after parotitis onset.

Therefore, mumps cases should not be ruled out by negative laboratory results. Serologic tests should be interpreted with caution, as false positive and false negative results are possible with IgM tests.

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 lists the criteria that must be met for a case to be classified as confirmed or probable.

Table VII-B. Criteria for case classification for a case of mumps.

Criterion	Confirmed		Probable		Suspect	
Clinical Evidence						
Acute parotitis or other salivary gland swelling lasting at least 2 days	O	O	O	O	O	
Orchitis	O	O	O	O	O	
Oophoritis	O	O	O	O	O	
Aseptic meningitis	O	O				
Encephalitis	O	O				
Hearing loss	O	O				
Mastitis	O	O				
Pancreatitis	O	O				
Laboratory Evidence						
Positive test for serum anti-mumps IgM antibody			N			O
Detection of mumps virus with RT-PCR	N					O
Isolation of mumps virus in cell culture from a clinical specimen		N				O
Epidemiological Evidence						
Epidemiological linkage to another probable or confirmed case				O		
Epidemiological linkage to a group/community defined by public health during an outbreak of mumps				O		

Notes:
S = This criterion alone is Sufficient to classify a case.
N = This criterion in conjunction with all other "N" and any "O" criteria in the same column is required to classify a case.
O = At least one of these "O" criteria in each category in the same column (e.g., clinical evidence and laboratory evidence)—in conjunction with all other "N" criteria in the same column—is required to classify a case.

VIII. Period of Surveillance

Surveillance should be on-going.

IX. Data sharing/release and print criteria

Notification to CDC for confirmed and probable cases of mumps is recommended.

- Data reported to NCIRD staff is summarized weekly internally via an NCIRD weekly surveillance report for vaccine preventable diseases. Electronic reports of mumps cases in NNDSS are also summarized weekly in the MMWR Tables. Annual case data on mumps is also summarized in the yearly Summary of Notifiable Diseases. Cumulative data is used for Healthy People 2020 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.

- State-specific compiled data will continue to be published in the weekly reports and annual MMWR Surveillance Summaries. 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.

- We do not plan on re-releasing case data on mumps cases to WHO or other parties.

X. References

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XI. Coordination:

Agencies for Response:

(1) Thomas R Frieden, MD, MPH
Director
Centers for Disease Control and Prevention
1600 Clifton Road, NE
Atlanta GA 30333
(404) 639-7000
txf2@cdc.gov

XII. Submitting Author:

(1) Paul Cieslak, MD
Manager, Acute and Communicable Disease Prevention
Oregon Department of Human Services
800 NE Oregon St./Suite 772
Portland, OR 97232
(971) 673-1111
paul.r.cieslak@state.or.us