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Mumps

Surveillance and Investigation Protocol

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I. ABOUT THE DISEASE

Mumps is an acute viral illness caused by infection with a paramyxovirus and is transmitted person to person through direct contact with saliva or respiratory droplets of a person infected with the virus. While mumps typically presents with parotitis, mumps infection may present only with nonspecific or primarily respiratory symptoms or may be asymptomatic. Mumps can occur in a person who is fully vaccinated, but vaccinated persons are at much lower risk for mumps and mumps complications. Mumps can also occur in patients who previously had natural infection (reinfection).

Mumps occurs globally and is not as well controlled as measles and rubella. In the United States, the incidence of mumps has steadily declined since 1967 when the first mumps vaccine was licensed. However, an increase in the number of reported mumps cases has occurred in recent years with notable peaks in 2006, 2016-2017, and 2019.

A. Clinical Presentation

Mumps usually involves pain, tenderness, and swelling in one or both parotid salivary glands located under the ears. Other salivary glands (submandibular and sublingual) under the floor of the mouth also may swell but do so less frequently (10%). Swelling usually peaks in 1-3 days and then subsides during the next week. On palpation, often the jawbone cannot be felt because of swelling of the parotid salivary gland(s). Mumps infection is most often confused with swelling of the lymph nodes of the neck. Lymph node swelling can be differentiated by the well-defined borders of the lymph nodes, their location behind the angle of the jawbone, and lack of ear protrusion or obscuring of the angle of the jaw, which are characteristics of mumps. Other causes of parotitis include duct obstruction, inflammatory conditions, or other infectious etiologies such as influenza, parainfluenza, Epstein-Barr virus, or SARS-CoV-2.

Mumps infection typically presents with parotitis but may present solely with non-specific or respiratory symptoms or may be asymptomatic. Nonspecific prodromal symptoms may precede parotitis and include fever, headache, myalgia, anorexia, and malaise. Fever typically lasts 3-4 days and parotitis lasts 5 days on average but may persist for 10 days or longer. Symptoms in vaccinated persons may be milder. The most common complications of mumps include orchitis, oophoritis, mastitis, pancreatitis, hearing loss, meningitis, and encephalitis. Complications may occur in the absence of parotitis. Mumps should be

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suspected in all patients with parotitis, regardless of age, vaccination status, and travel history.

B. Etiologic Agent

Mumps is caused by an RNA virus classified as a *Rubulavirus* of the *Paramyxoviridae* family.

C. Reservoir

Humans are the only known natural reservoirs.

D. Incubation Period

The incubation period is between 12 to 25 days, with an average of 16 to 18 days.

E. Mode of Transmission

The mumps virus replicates in the upper respiratory tract and is transmitted person to person through direct contact with saliva or respiratory droplets, usually when an infected person coughs or sneezes. It can also be transmitted through fomites (e.g., toys) contaminated with infectious droplets. Mumps typically requires close contact to spread, especially among vaccinated populations.

Close contact is defined for mumps as:

- Having direct contact with a mumps patient's infectious respiratory secretions by droplet transmission (e.g., kissing, sharing saliva-contaminated objects like water bottles, or being coughed or sneezed on). Droplets generally travel ≤3 feet when an infected person talks, coughs, or sneezes; or
- Being in close proximity for a prolonged period of time with a person infected with mumps during their infectious period (2 days prior to 5 days after onset of parotitis or other salivary gland swelling)

F. Period of Communicability

Maximum infectiousness occurs between 2 days before to 5 days after onset of parotitis.

II. DISEASE CONTROL AND PREVENTION

A. Disease Control Objectives

When a case is identified, prevent additional cases by:

1. Assuring the case is placed on droplet precautions in addition to standard precautions until 5 days after the onset of parotitis.

2. Early identification and vaccination of close contacts to cases if needed.
3. Disinfecting items potentially contaminated with saliva and respiratory secretions from infected individuals.

B. Disease Prevention Objectives

1. Prevent cases of mumps by encouraging mumps vaccination of all susceptible individuals per the Advisory Committee on Immunization Practices' recommendations.

C. Disease Prevention and Control Intervention

MMR vaccine prevents most, but not all, cases of mumps. People who have received two doses of MMR are nine times less likely to get mumps compared to unvaccinated people with a similar exposure. Prolonged close contact with a mumps case increases the chance of mumps infection in fully vaccinated people; however, the illness will likely be less severe. When mumps outbreaks occur, high vaccination coverage helps limit the size, duration, and spread of mumps. During an outbreak, a third dose of MMR vaccine may be recommended for groups of people who public health authorities determine are at increased risk for acquiring mumps.

Mumps can also be prevented by practicing cough etiquette, washing hands often, not sharing objects that may be contaminated with saliva, and increased cleaning of high-touch surfaces.

D. Treatment

Management is supportive to help relieve symptoms.

III. DISEASE INVESTIGATION

A. Criteria for Case Ascertainment

<u>Clinical Criteria for Reporting</u>

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

- In the absence of a more likely alternative diagnosis:
    - An acute illness characterized by parotitis (i.e., acute onset of unilateral or bilateral tender, self-limited swelling of the parotid) or swelling of other (non-parotid) salivary gland(s), **OR**

- An acute illness characterized by at least one of the following mumps-associated complication(s): orchitis, oophoritis, aseptic meningitis, encephalitis, hearing loss, mastitis, or pancreatitis.

Laboratory Criteria for Reporting

Laboratory tests for acute mumps infection without clinical information.

- Positive reverse-transcriptase polymerase chain reaction (RT-PCR) for mumps-specific nucleic acid[b], **OR**
- Isolation of mumps virus, **OR**
  Significant rise (i.e., at least a 4-fold rise in quantitative titer or seroconversion[c]) in paired acute and convalescent serum mumps immunoglobulin G (IgG) antibody[b], **OR**
- Positive test for serum mumps immunoglobulin M (IgM) antibody[b,d]

Vital Records Criteria for Reporting

- A person whose death certificate lists mumps as an underlying cause of death or significant condition contributing to death.

Healthcare Record Criteria for Reporting

- A person whose healthcare record contains a diagnosis of mumps (exclude reports in which mumps is ruled out).

B. Case Definition and Case Classification

Case Definition for Case Classifications

Clinical Criteria

In the absence of a more likely alternative diagnosis, an acute illness characterized by:

- Parotitis or swelling of other (non-parotid) salivary gland(s) of any duration, **OR**
- At least one of the following mumps-associated complication(s):
  - Orchitis
  - Oophoritis
  - Aseptic meningitis
  - Encephalitis
  - Hearing loss
  - Mastitis
  - Pancreatitis

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Laboratory Criteria*[a]

Confirmatory Laboratory Evidence:

- Positive reverse transcriptase polymerase chain reaction (RT-PCR) for mumps-specific nucleic acid[b], **OR**
- Isolation of mumps virus, **OR**
- Significant rise (i.e., at least a 4-fold rise in a quantitative titer or seroconversion[c]) in paired acute and convalescent serum mumps immunoglobulin G (IgG) antibody[b]

Supportive Laboratory Evidence:

- Positive test for serum mumps immunoglobulin M (IgM) antibody[b,d]

** Note: The categorical labels used here to stratify laboratory evidence are intended to support the standardization of case classifications for public health surveillance. The categorical labels should not be used to interpret the utility or validity of any laboratory test methodology.*

[a]A negative laboratory result in a person with clinically compatible mumps symptoms does not rule out mumps as a case.

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

[c]Seroconversion is defined as a negative serum mumps IgG followed by a positive serum mumps IgG.

[d]May be ruled out by a negative convalescent mumps IgG antibody using any validated method.

Epidemiologic Linkage Criteria:

- Exposure to or contact with a confirmed mumps case, **OR**
- Member of a group or population identified by public health authorities as being at increased risk for acquiring mumps because of an outbreak

Case Classifications

Confirmed

- Meets confirmatory laboratory evidence

Probable

- Meets clinical criteria **AND** epidemiologic linkage criteria, **OR**
- Meets supportive laboratory evidence **AND**
    - Meets clinical criteria of:
        - ≥2-day duration of parotitis or other salivary gland swelling **OR**
        - a mumps-related complication **AND**
    - Does NOT meet epidemiologic linkage criteria**

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- Meets the clinical criteria but does not meet laboratory or epidemiologic linkage criteria, **OR**
- Meets supportive laboratory evidence but does not meet the clinical criteria **AND** has documentation that mumps was suspected

***These are considered sporadic cases.*

Criteria to Distinguish a New Case of Mumps from Reports or Notifications which Should Not be Enumerated as a New Case for Surveillance

The following should be enumerated as a new case:

- Person with a new onset of symptoms that meets the criteria for a confirmed or probable case; OR
- Person not previously enumerated as a case with a newly available laboratory result that meets the criteria for a confirmed case; **OR**
- Person was previously reported but not enumerated as a confirmed or probable case (e.g., suspect), then subsequently available information meets the criteria for a confirmed or probable case.
- Person was previously enumerated as a case followed by a documented period of recovery **AND** newly meets the criteria for a confirmed or probable case.***

**** Mumps generally confers life-long protection. There have been a few reports of recurrent mumps that have occurred weeks to months after the prior acute onset of mumps infection. However, data on the timing between two mumps infections is unknown. CDC consultation is encouraged for case classification of persons with possible recurrent mumps.*

C. Reporting Timeframe to Public Health

Report within 24 hours to the local health department.

D. Outbreak Recognition

An outbreak may be defined as two or more cases in a county or one or more cases in a congregate setting (such as school or workplace).

E. Healthcare Provider Responsibilities

1. Assure healthcare workers who care for patients with mumps are immune to mumps by any of the following of the criteria:
    a. Documentation of two doses of MMR vaccine at least 28 days apart on or after the first birthday, or

b. Laboratory evidence of immunity (e.g., positive IgG antibody test for mumps).

2. Suspect mumps patients should be placed in isolation (standard and droplet precautions) immediately. Isolation should be maintained for 5 days after the onset of parotitis.
3. Report all suspected cases of mumps to your local health department immediately by phone and using the West Virginia Electronic Disease Surveillance System (WVEDSS) form available at: https://oeps.wv.gov/mumps/Documents/lhd/Mumps.pdf
4. Submit positive laboratory test results to the state via electronic laboratory reporting (ELR) to the West Virginia Electronic Disease Surveillance System (WVEDSS). If healthcare provider has no ELR capability, fax test results to the local health department or the state at (304) 558-8736.
5. Contact your local health department to coordinate testing of a suspected mumps case.
6. If testing is determined to be appropriate, collect a buccal swab. The shipping of specimens should be coordinated through the West Virginia Office of Laboratory Services and the Division of Infectious Disease Epidemiology. For information on how to collect a buccal swab, please see https://www.cdc.gov/mumps/lab/detection-mumps.html.

F. Laboratory Responsibilities

1. Immediately notify the healthcare provider and the facility infection control practitioner of a positive laboratory result for mumps
2. Immediately report a positive laboratory result of mumps to your local health department via fax or by phone; or West Virginia Division of Infectious Disease Epidemiology (DIDE) via fax at 304-558-8736.
3. Submit an isolate to the Office of Laboratory Services for further testing and confirmation.

G. Local Health Responsibilities

1. Educate laboratories and providers to report a suspected case of mumps to your local health department immediately.
2. Ensure that employees who will investigate a case of mumps have:
   a. Documentation of two doses of MMR vaccine at least one month apart on or after the first birthday, or
   b. A positive IgG antibody test for mumps

3. Review the laboratory report of a suspect mumps case immediately upon receiving it, to see if PCR or viral culture was done. If not, **ensure appropriate testing is done by collecting buccal swab for mumps diagnosis**.
4. The West Virginia Office of Laboratory Services (OLS) accepts buccal, nasopharyngeal, or throat swabs for mumps testing, see WV Office of Laboratory Services VPD Referral Testing Guidance for instructions. Specimens submitted to WV OLS will be sent to the Wisconsin State Laboratory of Hygiene (WSLH) for PCR and genotype testing. Complete a general lab specimen submission form and the Referral Testing Specimen Submission Form and send to WV OLS along with labeled specimens.
5. CDC highly recommends testing a suspected symptomatic case of mumps by use of viral RNA by real-time PCR (rRT-PCR) and serology if it has been greater than 3 days since symptom onset or the patient has an acute potential mumps complication. Although the WSLH does not accept serum specimens, if the provider wishes to have serology testing performed, serum should be collected at the same time as specimens for viral PCR and submitted to a reference lab. See: https://www.cdc.gov/mumps/lab/index.html for detailed laboratory testing information.
6. Investigate any suspected case of mumps immediately using the mumps WVEDSS form: https://oeps.wv.gov/mumps/Documents/lhd/Mumps.pdf. The following components should be included in the case investigation:
    a. Establish a diagnosis of mumps by using mumps case definition. Because clinical diagnosis of mumps may be unreliable, cases of mumps should be laboratory confirmed. Case definition can be found on section III. B. or at: https://ndc.services.cdc.gov/case-definitions/mumps-2012/.
    b. Obtain accurate and complete immunization histories that document any doses of mumps-containing vaccine. Vaccination histories may be obtained from schools, medical providers, or on immunization records provided by the patient. Verbal history of mumps vaccination is not considered adequate proof of vaccination.
    c. Assess potential transmission and identify contacts of the case-patient during the infectious period (2 days before and 5 days after onset of parotitis). See below for additional information on care of exposed people.
    d. Identify the source of infection for every confirmed case of mumps. Case-patients should be asked about contact with other known cases. When history of contact with a known case cannot be established, opportunities for exposure to unknown cases should be sought. After determining when and where transmission likely occurred, investigation efforts should be directed to locations visited.

e. Assure that mumps viral isolation (buccal, nasopharyngeal, or throat swabs) is performed for all suspected mumps cases.

7. Immediately identify all suspected or confirmed cases of mumps to initiate control measures to prevent the spread of the disease among susceptible persons.
8. Isolate (with droplet precautions) all symptomatic suspected mumps cases for five days after the onset of parotitis.
9. Notify your regional epidemiologist and DIDE immediately when you have a suspected case of mumps.
10. When a case of mumps is identified, known close contacts (see Mode of Transmission for definition) should be assessed for presumptive evidence of immunity. For non-healthcare workers, presumptive evidence of immunity includes:
    - Documentation of age-appropriate vaccination with a mumps virus-containing vaccine
    - Laboratory evidence of immunity
    - Laboratory confirmation of disease, or
    - Born before 1957

    Close contacts without evidence of immunity should be brought up to date on MMR vaccination. All close contacts should monitor for signs and symptoms for 25 days after exposure, avoid large gatherings or events with intense close contact if possible, and self-isolate for 5 days if they develop any symptoms.
11. In addition to known close contacts, identify groups of people who are likely to have close contact with a mumps patient (i.e., coworkers on the same shift who socialize after work, students in the same study group or clubs, athletes who practice together in the same facility and share equipment). Assessing the need to implement control measures in these groups should be based on the setting and the risk of mumps transmission. For additional information, see https://www.cdc.gov/mumps/health-departments/strategies.html#identify.
12. In a congregate setting such as a school or workplace, exclude persons without evidence of immunity* to mumps until:
    a. They have received a dose of MMR or
    b. At least 25 days have passed after the onset of parotitis in the last person with mumps. *See number 1. under the Healthcare Provider Responsibilities section for criteria regarding evidence of immunity.
13. Immunization Recommendations:
    a. Counties without an outbreak: Absent contraindications, all persons should be immunized with the first dose of MMR on or after the first birthday. Adults

should have one dose (birth before 1957 may be used as presumptive evidence of immunity). A second dose may be given at any time > 4 weeks after the first dose. A second dose should be given to:

i. School children
ii. Persons in college or other training after high school
iii. Health care workers (birth before 1957 may be used as presumptive evidence of immunity)

b. Counties with an outbreak (two or more cases or one case in a congregate setting): Absent contraindications, all persons should be immunized with the first dose of mumps containing vaccine on or after the first birthday. Adults should have one dose (birth before 1957 is NOT considered evidence of immunity during an outbreak). A second dose of mumps containing vaccine may be given at any time > 4 weeks after the first dose of mumps containing vaccine. A second dose of mumps containing vaccine should be given to:

i. School children
ii. Persons in college or other training after high school
iii. Health care workers (birth before 1957 is NOT considered evidence of immunity during an outbreak)

c. Others should be offered a second dose of MMR as indicated by outbreak epidemiology, e.g., children ages 1-4 years and adults.
d. Persons previously vaccinated with two doses of mump virus-containing vaccine who are identified by public health authorities as being part of a group or population at increased risk for acquiring mumps because of an outbreak may receive a third dose of a mumps virus-containing vaccine to improve protection against mumps disease and related complications.

14. In outbreak settings, conduct active (enhanced) surveillance for mumps for at least two incubation periods (50 days, two times the maximum incubation period) following onset of parotitis in the last case, in all affected areas for persons with parotitis or other salivary gland inflammation.

H. State Health Responsibilities

1. Assist local health jurisdictions in responding to mumps cases and outbreaks.
2. Provide technical support on surveillance, investigation, case ascertainment, laboratory testing, and the prevention and control of mumps.
3. Maintain mumps awareness among public health partners and the public.
4. Develop guidance documents, protocols, alerts, and information sheets for public health and health care providers.

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5. Review mumps reports in WVEDSS for completeness prior to submission to CDC.

I. Occupational Health

1. Document presumptive evidence of immunity to mumps for all healthcare personnel.
2. Provide 2 doses of MMR vaccine to healthcare personnel without evidence of immunity.
3. Exclude healthcare personnel with active mumps infection until 5 days after the onset of parotitis. The date of onset is considered day 0.
4. Exclude healthcare personnel who do not have presumptive evidence of immunity who are exposed to someone with mumps. They should be excluded from the 10th day after the first unprotected exposure to mumps through the 25th day after the last exposure. Unprotected exposures are defined as being within 3 feet of a patient with a diagnosis of mumps without the use of proper personal protective equipment.
5. Educate exposed healthcare personnel to report any signs or symptoms of illness during the incubation period, from 12 through 25 days after exposure.
6. For additional healthcare-specific recommendations, see https://www.cdc.gov/mumps/health-departments/strategies.html.

IV. DISEASE SURVEILLANCE

A. Public Health Significance

In the prevaccine era, mumps was a significant cause of morbidity in the United States, with over 100,000 cases reported each year. The number of reported mumps cases in the United States has decreased more than 99% since licensure of the first mumps vaccine in 1967 but notable peaks have occurred in recent years. Since 2006, the majority of cases have occurred in fully vaccinated individuals, with most outbreaks occurring in close-contact settings. Maintaining high mumps vaccine coverage is important in reducing the severity of infections and vaccination plays an important role in limiting the size and duration of outbreaks.

The most common symptoms of mumps are fever and parotitis. Up to 25% of persons with mumps have few or no symptoms. Cases who are fully vaccinated tend to experience fewer complications and their illness is typically milder. Death due to mumps is very rare. Complications of mumps include:

- Orchitis (inflammation of the testicle)
- Oophoritis (inflammation of the ovary)
- Pancreatitis
- Deafness
- Aseptic meningitis

- Encephalitis.

Mumps continues to be endemic globally with over 500,000 cases reported annually. As of 2019, mumps vaccine is routinely used in 63% of countries in the world. Importation of mumps into the United States is now increasingly recognized.

B. Disease Surveillance Objectives

1. To rapidly detect and confirm a case of mumps in West Virginia.
2. Determine the incidence of mumps in West Virginia.
3. Determine the number of laboratory-confirmed cases reported in West Virginia.
4. If a case of mumps occurs in West Virginia:
    a. Characterize the complications of mumps.
    b. Identify sources and sites of transmission.
    c. Determine whether cases are due to failure to vaccinate or vaccine failure.
    d. Monitor the effectiveness of outbreak control strategies.
    e. Identify risk factors for infection.

C. Surveillance Indicators

1. The interval between date of symptom onset and date of public health notification.
2. The proportion of confirmed cases reported to CDC (NNDSS) with complete information for the following: Clinical case definition, hospitalization, laboratory testing, vaccination history, date reported to health department, transmission setting, outbreak related, epidemiologic linkage, date of birth, and onset date.
3. The proportion of confirmed cases that are laboratory confirmed.
4. The proportion of cases that have an imported source.

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