Mumps: Case and Outbreak Investigation

February 2025

Pathogen

Mumps is an acute viral illness caused by an RNA virus in the Paramyxoviridae family.

Clinical symptoms

Prodromal symptoms are nonspecific and may include myalgia, anorexia, malaise, headache, and low-grade fever. The most common manifestation is unilateral or bilateral swelling of one or more of the salivary glands, usually the parotid glands (parotitis), which occurs in 30%-40% of infected persons. Parotitis tends to occur within the first 2 days of infection and may first be noted as earache and tenderness on palpation of the angle of the jaw. Symptoms tend to decrease after 1 week and usually resolve after 10 days. Approximately 40-50% of infections may have nonspecific or respiratory symptoms only, and as many as 20% of mumps infections may be asymptomatic.

Differential diagnosis

Mumps virus is the only cause of epidemic parotitis. Parotitis – especially sporadic cases – may be due to causes other than mumps. Infectious causes of parotitis include Epstein-Barr virus, human herpesvirus B6 (the cause of roseola), cytomegalovirus, parainfluenza virus types 1 and 3, influenza A virus, coxsackieviruses and other enteroviruses, lymphocytic choriomeningitis virus, human immunodeficiency virus, *Staphylococcus aureus*, and nontuberculous *Mycobacterium*.

Complications

Orchitis (testicular swelling) is a common complication and may occur in as many as 30% of unvaccinated post-pubertal males and 6% of vaccinated post-pubertal males. Uncommon complications include oophoritis, pancreatitis, encephalitis, hearing loss (either transient or permanent), arthritis, thyroiditis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, thrombocytopenia, cerebellar ataxia, and transverse myelitis. Mumps complications are more common among unvaccinated persons compared to vaccinated persons, and more common among adults compared to children.

Mumps during the first trimester of pregnancy is associated with an increased rate of spontaneous abortion. Although mumps virus can cross the placenta, there is no evidence that this results in congenital malformation.

Modes of transmission

Transmitted by contact with respiratory secretions or droplets from the respiratory tracts of infected persons.

Mumps exposure

Exposure can occur during unprotected face-to-face (<3 feet) contact with an infectious person for at least 5 minutes; having direct contact with a mumps patient's infectious respiratory secretions (e.g., kissing, sharing saliva-contaminated objects like water bottles, or being coughed or sneezed on); being in close proximity for a prolonged period of time with a person infected with mumps during their infectious period. Droplets generally travel ≤3 feet when an infected person talks, coughs, or sneezes.

Incubation period
12 to 25 days after exposure (usually 16-18 days).

Period of communicability
A person with mumps is considered infectious from 2 days before through 5 days after parotitis onset. Persons with asymptomatic infection are also capable of transmitting the virus.

Laboratory testing
The preferred method for confirming acute mumps infection is detection of virus from a buccal specimen by polymerase chain reaction (PCR). Collection of a buccal specimen within 1 to 3 days of parotitis onset is optimal, but virus may be detected for up to 9 days after parotitis onset. Acute mumps infection may also be laboratory confirmed by the presence a significant rise in IgG antibody titer in acute- and convalescent-phase serum specimens, or a positive mumps virus culture.

Serum mumps IgM may also be used to detect acute mumps infection. However, mumps IgM response may be attenuated or absent in vaccinated persons, making serologic confirmation difficult. Additionally, false positive IgM results are known to occur.

Persons with detectable mumps IgG titers have still developed mumps infection.

For more information about mumps testing, see the Viral and Rickettsial Disease Laboratory (VRDL) Test Catalog.

Mumps Case Definition
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):
  - Aseptic meningitis
  - Encephalitis
  - Hearing loss
  - Mastitis
  - Orchitis
  - Oophoritis
  - Pancreatitis

Confirmatory Laboratory Evidence[*a]
- 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[*a]

- 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 Evidence

- 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.

***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[**]

Suspect

- Meets the clinical criteria but does not meet the 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.

- Report suspected, probable, and confirmed cases to CDPH via CalREDIE or the CDPH Mumps case report form.

Immunization

Live-attenuated mumps vaccine is given as part of measles, mumps, and rubella (MMR) vaccine in the U.S. Post-licensure data estimate the that the effectiveness of the mumps component of the MMR vaccine is less than that of the measles and rubella components.

One dose of MMR vaccine is approximately 78% effective for mumps (range: 49%−92%), while two doses of MMR are approximately 88% effective for mumps (range: 32%–95%). In recent outbreaks, mumps infections have occurred in persons with a history of 2 doses of mumps vaccine. While the effectiveness of two doses of MMR against mumps is high, serologic and epidemiologic studies suggest this effectiveness may wane over time. In outbreak situations, a third dose of MMR may help provide short term protection for those who are likely to have close contact with a mumps case.

Postexposure prophylaxis (PEP)
There is no available postexposure prophylaxis for mumps. Neither mumps containing vaccine nor immune globulin (IG) is effective for mumps postexposure prophylaxis.

Case investigation
1. Confirm clinical signs and symptoms of mumps.
2. Arrange for PCR testing, if appropriate. A buccal swab collected within 3 days of parotitis onset is preferrable. Collect specimens as described in CDPH VRDL's test catalog section for mumps and send to VRDL or local public health lab for testing, if feasible.
3. Ensure case isolation for 5 days after parotitis onset.
4. Identify any possible sources of exposure, i.e., contact with a person with mumps and/or recent travel to an area of the world where mumps is endemic/epidemic. Also determine if the suspect case has been to any high-risk settings (i.e. large congregate settings, colleges/universities, etc.) while infectious.
5. Identify all household and other close contacts and assess their mumps immunity status. Refer known susceptible contacts, contacts who have had only one dose of MMR vaccine, and/or who have unknown MMR immunization status for vaccination. Postexposure vaccination will not prevent or alter the clinical severity of mumps. However, if the current exposure to mumps does not cause infection, vaccination should induce protection against subsequent infection.
6. Assess occupational status of household contacts; if any household member is a healthcare worker, see section on "Mumps in Healthcare Settings".
7. If one confirmed case occurs in a childcare center or school, exposed persons who are unvaccinated or have had only one dose of MMR should be brought up to date. Exposed persons without two doses of MMR should not be excluded from attending school. In outbreaks among older children and adolescents, offering a third to contacts with 2 documented MMR doses may be considered.

Mumps on College Campuses and Other Congregate Living Settings
Notify CDPH of any suspected mumps cases in college students or residents of other congregate settings, such as jails, prisons, detention centers, or military barracks. Mumps can spread quickly in these settings, even among persons with two doses of MMR vaccine. Action steps should include immediate testing and isolation of the suspected case, and consideration of vaccination of contacts.

In addition, if an outbreak occurs, a third dose of MMR vaccine may be recommended for those groups determined to be at an increased risk of mumps infection. See additional information on outbreak control strategies. For single cases, a third dose intervention may be considered on a case-by-case basis for high-risk contacts, such as sports teammates, roommates, etc. Please contact CDPH for assistance in recommending and administering additional doses of MMR vaccine.

Mumps in Healthcare Settings
If a confirmed or probable case has visited a healthcare setting, healthcare workers in that setting with unprotected exposure who do not have documented immunity to mumps should be excluded from work from the 10th day after the first exposure through the 25th day after the last exposure. See more information from the CDC regarding mumps in healthcare settings.