Mumps

Investigative Guidelines

January 2025

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. To assess the burden of mumps infections in Oregon.
2. To identify cases and educate potentially exposed persons about signs and symptoms of disease, thereby reducing the risk of further transmission.
3. To identify and vaccinate susceptible individuals.

1.2 Laboratory and Physician Reporting Requirements

Physicians are required to report all cases (including suspected cases) within one working day. Labs are required to report mumps-specific positive tests (e.g., IgM, virus isolation, PCR) within one working day. According to OAR 333-018-0018, positive **PCR** specimens must be sent to Oregon State Public Health Laboratory (OSPHL) **for genotyping**.

1.3 Local Public Health Authority Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive cases (see definitions below) to the Acute and Communicable Disease Prevention section (ACDP) within one working day.
2. Begin follow-up investigation within one working day. Submit all case data electronically within 7 days of the initial report.
3. Initiate appropriate control measures within 1 working day of initial report (see §5, Controlling Further Spread).

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

Mumps is caused by a single-stranded, RNA paramyxovirus.

2.2 Description of Illness

Prodromal symptoms are nonspecific; they include myalgia, anorexia, malaise, headache, and low-grade fever, and may last for 3–4 days.

Parotitis (inflammation and swelling of the parotid salivary glands) is the most common manifestation of clinical mumps, affecting 30–40% of infected persons. Parotitis can be unilateral or bilateral; other combinations of single or multiple salivary glands may be affected. Parotitis usually occurs within the first 2 days of

symptom onset and may present as an earache or tenderness on palpation of the angle of the jaw. Symptoms usually decrease within 1 week and generally resolve within 10 days.

Up to 20% of infections are asymptomatic; an additional 40–50% may have only nonspecific or primarily respiratory symptoms.

The most common complication is orchitis, affecting up to 50% of males who have reached puberty. While painful, only rarely does this lead to infertility. Other complications are rare, but may include encephalitis, meningitis, oophoritis, mastitis, pancreatitis, myocarditis, arthritis, and nephritis. You name it, we'll inflame it. Spontaneous abortion (miscarriage) can occur if an infection occurs during pregnancy, particularly in the first trimester. Mumps infection can rarely (~1 in 10,000) cause deafness, which is usually permanent.

Differential diagnosis: parotitis is not pathognomonic; it can also be caused by infection with cytomegalovirus, parainfluenza virus types 1 and 3, influenza A, Coxsackie A, echovirus, lymphocytic choriomeningitis virus, and HIV, as well as *Staphylococcus aureus* and other bacteria. Non-infectious causes of parotitis include drugs, tumors, immunologic diseases, and obstruction of the salivary duct.

2.3 Reservoirs

Infected humans. Although persons with asymptomatic or atypical infection can transmit the virus, no carrier state is known to exist.

2.4 Modes of Transmission

Respiratory droplets, direct contact with the saliva of an infected person and perhaps airborne transmission.

2.5 Incubation Period

Usually 16–18 days (range 12–25 days).

2.6 Period of Communicability

Typically, from 2 days before until 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms).

2.7 Treatment

No specific treatment.

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Confirmed Case Definition (Reportable to OHA)

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

3.2 Presumptive Case Definition (Reportable to OHA)

In a person with epidemiologic linkage to mumps[†] recent exposure to or contact with a confirmed mumps case, or who is a member of a group or population identified by public health authorities as being at increased risk for acquiring mumps because of an outbreak:

- Parotitis or swelling of other (non-parotid) salivary glands(s) of any duration, **OR**
- At least one mumps-related complication[‡]

OR

In a person *without* epidemiologic linkage to another case,

- Positive test for serum mumps immunoglobulin M (IgM) antibody[*,§] **AND**
- ≥2-day duration of parotitis or other salivary gland swelling **OR** at least one mumps-related complication[‡]

3.3 Suspect Case Definition (Not reportable to OHA)

- Parotitis, acute salivary gland swelling, orchitis, or oophoritis with neither a positive mumps test nor epidemiologic linkage

OR

- A positive mumps IgM result with no mumps clinical symptoms (with or without epidemiologic linkage to a confirmed or presumptive case)

Suspect cases should be reported by physicians to local health departments, but are not officially reportable to ACDP. (Of course, we're always happy to talk about them and help arrange for the kind of testing that may upgrade their status.)

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[*] Not explained by mumps vaccination during the previous 45 days.
[†] Recent exposure to or contact with a confirmed mumps case, or who is a member of a group or population identified by public health authorities as being at increased risk for acquiring mumps because of an outbreak
[‡] Orchitis, oophoritis, aseptic meningitis, encephalitis, hearing loss, mastitis, pancreatitis
[§] Not ruled out by a negative convalescent mumps IgG antibody test.

3.4 Services Available at the Oregon State Public Health Laboratory (OSPHL)

Serologic (antibody) testing for mumps can be performed by clinical laboratories. Please contact the laboratory for their requirements prior to specimen collection.

OSPHL performs PCR testing for suspected mumps cases. **All suspect mumps cases and specimens submitted for PCR testing at OSPHL must be coordinated with and approved by ACDP (see testing algorithm at end of document).**

If mumps is considered a real possibility:

- Contact ACDP epidemiologists for approval to test specimens at OSPHL.
- After the request has been approved, please refer to the OSPHL Lab Test Menu for all specific instructions to properly collect, store, and transport specimens, available at: www.healthoregon.org/labtests.
- Collect the following required information: submitter, method of transport, expected specimen arrival date, tracking number, patient initials, DOB, rash onset date, specimen collection date, and specimen type.
  Persons suspected to have mumps should have specimens collected for PCR testing (buccal swab only) at the time of the first healthcare visit.

Ideally, efforts should be made to collect buccal swabs within 3 days of onset of parotitis. It is still possible to detect mumps up to day 5 after onset of parotitis, although the likelihood of detection declines significantly.

The early collection of buccal swab specimens provides the best means of laboratory confirmation, particularly among suspected mumps patients with a history of vaccination. In outbreaks among two-dose vaccine recipients, mumps virus RNA was detected in samples from 30%–71% of case-patients if the samples were collected within 3 days following onset of parotitis.[1]

At the initial visit, a serum specimen should be obtained to test for mumps IgM antibodies. In unvaccinated cases, IgM is present by day 5 post onset of symptoms. Therefore, among unvaccinated persons, serum collected less than 5 days after onset of parotitis and the IgM is negative, mumps cannot be ruled out, and a second serum sample collected at least 5 days after onset is recommended. The timing of the IgM response to mumps infection in vaccinated persons is highly variable. Their IgM response may be absent or short lived, and false-positive and false-negative results are possible. If the acute-phase IgM result is negative among vaccinated people, a second (convalescent) serum specimen could be collected ≥10 days after the onset of symptoms.

In unvaccinated persons, IgG antibody increases rapidly after onset of symptoms and is long-lasting. The paired serum specimens also can be used to detect a significant rise in IgG antibody levels. Among vaccinated persons, the IgG may already be quite elevated in the acute-phase blood sample, which may preclude finding a fourfold rise in IgG titer in the convalescent serum specimen.

The ability to detect IgM varies by vaccination status and is highest in unvaccinated persons (80%– 100%)[1] intermediate in one-dose vaccine recipients (60%–80%) [2], and lowest in two-dose vaccine recipients (13%–14%) [3].

Parainfluenza viruses 1, 2, and 3, Epstein-Barr virus, adenovirus, and human herpesvirus 6 have all been noted to interfere with mumps serologic assays.

4. ROUTINE CASE INVESTIGATION

Because clinical diagnosis of mumps may be unreliable, efforts should be made to confirm each suspect case with lab testing. Studies suggest that <20% of sporadic parotitis is due to mumps infection. Mumps is the only known cause of epidemic parotitis, however. Experience indicates that case investigations combined with lab testing will result in many suspected mumps cases being discarded. In addition, consider asking the reporting provider questions such as "Have you tested for other viruses?"

4.1 Identify the Source of Infection

Try to determine whether a suspected case was in contact with a known case or had recently traveled to area whence mumps transmission is being reported.

4.2 Identify Potentially Exposed Persons (Contacts)

Cases are potentially infectious from 2 days before to 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms). To have a reasonable chance of exposure, persons must have come within range of droplet contamination from an infected person (say, within 1 m) or had other direct contact with their saliva. This contact must have occurred whilst the case was infectious and without the benefits of appropriate personal protective equipment (e.g., gloves and mask). The length of time a person must have been within this 1 m bubble to be worth worrying about is undefined. For action purposes, mumps exposure is defined as unprotected face-to-face (within 1 m) contact with an infectious person for at least 5 minutes. Generally, epi link for mumps means in the same room at the same time. This could be expanded in outbreak settings. Call ACDP with questions.

Identify household and other contacts (e.g., school or day care classmates and contacts in the healthcare setting) who may have been exposed to the case during the infectious period.

Questions sometimes arise about potential risk of transmission via fomites — e.g., mattresses in a wrestling match. Priority in contact tracing and management should be given to immediate close contacts (high-risk, household, and others meeting “close contact” exposure criteria). Although transmission of mumps via fomites might theoretically be possible, there are no data demonstrating that it occurs. Cleaning of surfaces contaminated with mucus, saliva, or other body fluids is, of course, always prudent. The close contact and the force of infection are the main contributors to mumps transmission in the two-dose vaccine era.

4.3 Determine Mumps Immune Status of Exposed Contacts

Nothing is foolproof, but any of the following are considered acceptable evidence of immunity:

- Birth before 1957 (but see §6.2)
- Laboratory-confirmed disease
- Laboratory evidence of immunity (protective antibody titers); or
- Documentation of vaccination as follows:
  - Pre-school children: 1 dose
  - Children in grades K–12: 2 doses
  - Healthcare personnel born during or after 1957: 2 doses
  - Students at post-high-school educational institutions: 2 doses
  - International travelers ≥12 months of age: 2 doses
  - All other adults: 1 dose

Note: given the rarity of mumps, a physician's clinical diagnosis in the absence of laboratory confirmation should not be considered "evidence of immunity."

5. CONTROLLING FURTHER SPREAD

5.1 Education

Advise patients to stay home and not go to school, work, public places or social activities of 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms). Make sure household members are immune to mumps. If family members are not immune, they should avoid contact during the time the case is infectious.

Instruct cases to wash their hands often or use hand sanitizer, to avoid sharing drinking glasses or eating utensils, to cover their coughs and sneezes with a tissue or their antecubital fossa and to stay home until 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms). Instruct contacts or parents to look for the symptoms and signs of mumps from 12 days after the first day of contact with a case during the period of communicability, through 25 days after the last contact. If suggestive symptoms develop, they should call their provider as soon as possible.

5.2 Isolation and School or Work Restrictions

Keep hospitalized patients under droplet precautions for 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms).

Cases who are employees of schools, day cares, and healthcare facilities should be excluded from work during the period of communicability.

Exclude children and students with confirmed and presumptive mumps from school or day care as long as they are contagious.

5.3 Protection of Contacts

Active Immunization

Generally, exposed contacts with evidence of immunity or adequate vaccination as described in Section 4.3 do not need vaccination. People who are under-immunized should be encouraged to complete their MMR series. (It might not protect them from this exposure, but could help avoid illness subsequently.) In rare outbreak situations, a third MMR might be considered. We'll work through those together.

Contraindications to vaccine include anaphylactic allergy to neomycin, gelatin or a previous dose of MMR vaccine, pregnancy, and immunodeficiency or immunosuppression. Persons with moderate or severe acute illness should not be vaccinated until the illness has resolved. Receipt of antibody-containing blood products (e.g., immune globulin, whole blood or packed red blood cells) may interfere with seroconversion following mumps vaccination. Vaccine should be given 2 weeks before, or deferred for at least 3 months following administration of an antibody-containing blood product.

Passive Immunization with Immune Globulin

IG is not effective; forget it.

6. MANAGING SPECIAL SITUATIONS 4

6.1 Control of Institutional Clusters

An outbreak is defined as three or more laboratory-confirmed cases linked by time and place. In situations where ≥3 cases occur in one single institution within two incubation periods (50 days), additional measure are appropriate.

Although mumps vaccination has not been shown to be effective in preventing mumps in persons already exposed, it will prevent infection in those persons who have yet to be exposed. If susceptible persons can be vaccinated early in the course of an outbreak, they can be protected. However, cases are expected to continue to occur among newly vaccinated persons who are already exposed for at least 3 weeks following vaccination because of the long incubation period for mumps.

The main strategies for controlling a mumps outbreak are defining the at-risk population and transmission setting, identifying, and isolating suspected cases, and rapidly identifying and vaccinating susceptible persons, or, if a contraindication to MMR vaccine exists, excluding susceptible persons from the setting to prevent exposure and transmission.

Mumps-containing vaccine should be administered to persons without evidence of immunity and everyone should be brought up to date with age appropriate vaccination (1 or 2 doses).

During an outbreak, persons identified as being at increased risk and previously vaccinated with:

- 1 dose of mumps–containing vaccine should receive a second dose. The second dose can be administered as early as 28 days after the first dose.
- 2 doses of mumps–containing vaccine should receive 1 additional dose if it has been at least 5 years since the last dose.

Persons at increased risk for acquiring mumps are those who are more likely to have prolonged or intense exposure to droplets or saliva from a person infected with mumps, such as through close contact or sharing of drinks or utensils. Consult with ACDP for assistance in identifying "persons…at increased risk for mumps because of an outbreak." No evidence is available regarding the benefit of an additional dose of a mumps virus–containing vaccine to persons with documentation of receipt of 3 previous doses.

If mumps is in your area, alert physicians, hospital emergency departments, student infirmaries, and other officials of the potential for additional cases; encourage them to consider mumps in persons with parotid swelling and fever, to report suspect cases promptly, and to obtain appropriate specimens for laboratory confirmation. Such "enhanced surveillance" should continue for 50 days (twice the maximum incubation period) after the date of illness onset in the last identified case.

Exclude persons without evidence of immunity to mumps from day care centers, schools, colleges, and healthcare institutions affected by a mumps outbreak. Once vaccinated, these persons can be readmitted. Those who remain unvaccinated should be excluded for at least 25 days after the onset of symptoms in the last person with mumps in the affected institution. In outbreak settings, control activities may need to be adjusted based upon circumstances. Consult with ACDP.

6.2 Healthcare Settings

Isolation and Quarantine

Do not allow suspect mumps cases to sit in waiting area for prolonged periods of time and keep them more than 3 feet from other patients. Ask that they wear a surgical mask. Droplet precautions should be maintained for 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms).

Patients known to have been cared for by a healthcare worker with confirmed or presumptive mumps during the communicable period (from 2 days before until 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms) should be notified. This will not prevent illness in such patients, because vaccination after exposure is not effective; however, it will enable the patients to isolate themselves promptly should they develop symptoms. Patients known to have been cared for by a healthcare worker with suspected mumps need not be notified while confirmatory tests are pending.

If an employee or healthcare worker develops a suspected case of mumps, exclude him from work until 5 days after onset of parotitis or other salivary gland swelling (or, in their absence, other symptoms).

Healthcare workers without evidence of immunity who have had unprotected exposures to mumps (defined as being within three feet of a patient with mumps for 5 minutes without the use of a surgical mask) should be excluded from work during the 12th through the 25th day after exposure. Meanwhile, attempts should be made to vaccinate the healthcare worker.

Exposed healthcare workers with documentation of a single dose of mumps vaccine may work following an exposure to mumps, but they should be given a second dose as soon as possible, but no sooner than 28 days after the first.

Healthcare workers with evidence of immunity do not need to be excluded from work following an unprotected exposure. However, because 1 dose of MMR vaccine is about 80% effective in preventing mumps and 2 doses are about 90% effective, some vaccinated personnel may contract mumps. Therefore, healthcare workers should be educated about symptoms of mumps, including non-specific presentations, and should notify employee health if they develop these symptoms.

References:

[1] Rota JS. Clin Vaccine Immunol. 2013 Mar;20(3):391–6

[2] Briss PA. J Infect Dis. 1994 Jan;169(1):77–82.

[3] Rota JS, J Med Virol. 2009 Oct;81(10):1819–25

UPDATE LOG

January 2025. Case definitions updated to reflect the CSTE ones.

February 2024. Acceptance criteria changed. OSPHL will only accept buccal specimens and remove oropharyngeal and urine as acceptable specimen sources. (Juventila Liko)

November 2018. Algorithm revised. (Juventila Liko)

August 2018. Updated recommendations regarding options for testing in Oregon. (Sarah Humphrey, Juventila Liko)

April 2018. More tweaking to vaccine recommendations during mumps outbreaks. (Juventila Liko, Paul Cieslak)

March 2018. Clarified the risk of transmission through contaminated objects. (Juventila Liko)

February 2018. Clarified the recommendation of the 3rd dose of mumps-containing vaccine during an outbreak. (Juventila Liko)

November 2017. Mumps exposure definition updated/clarified. (Juventila Liko)

October 2017. Added ACIP 3rd dose mumps-containing vaccine recommendation in an outbreak setting. (Juventila Liko)

April 2017. Communicability period clarified. (Paul Cieslak, David Shih)

January 2017. Removed WSPHL and added commercial laboratories for testing. (Paul Cieslak, Juventila Liko)

December 2016. Added laboratory confirmation to the outbreak definition. (Paul Cieslak, Juventila Liko)

November 2016. Clarified recommendations regarding immunization of contacts. (Richard Leman)

April 2016. Exclusion language clarified. (Juventila Liko)

March 2015. Added flowchart for testing criteria. (Juventila Liko)

February 2015. The lab section was updated to reflect the most recent OSPHL guidelines. (Juventila Liko)

September 2014. Added clarification about other potential diagnosis for mumps-like illnesses. (Juventila Liko)

August 2013. Outbreak definition revised to be more in line with the national definition. (Juventila Liko)

December 2012. Clarified LHD responsibilities regarding mumps testing at WSPHL. (Juventila Liko)

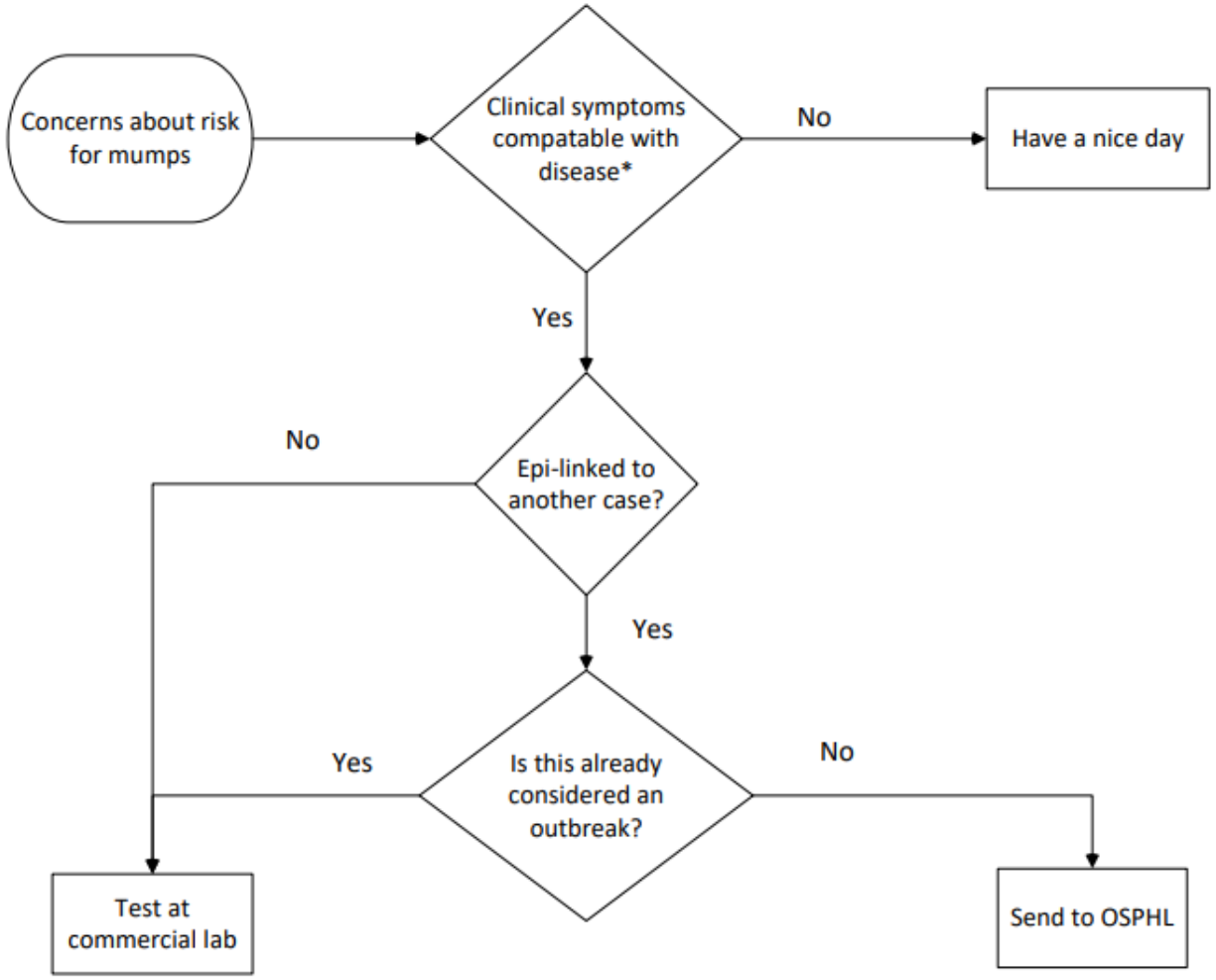
September 2011. Revised the lab section to reflect the current CDC recommendations and adding the testing availability at WSPHL for cases when disease is considered a possibility. Case definitions revised to be more in line with the national definition. (Juventila Liko)

March 2011. Minor wordsmithing of case definitions. (Juventila Liko)

April 2010. Changes included an adjusted period of communicability and an expanded lab recommendation to reflect new CDC recommendations. (Juventila Liko)

Testing criteria for mumps

Revised 11/2019



Mumps:
An acute illness characterized by:
Parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis.