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.

1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive cases (see definitions below) to the Acute and Communicable Disease Prevention program (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. If mumps is suspected, facilitate collection and transport of specimens immediately to Washington State Public Health Laboratories (WSPHL). Collect data that must accompany all specimens sent to WSPHL (see § 3.2).
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 choriomeningi-
Mumps

tis 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 chronic 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 symptoms.

2.7 Treatment
No specific treatment.

3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

3.1 Case Definition(s)
Confirmed (reportable to OHA)
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
• mastitis
• oophoritis
• orchitis
• pancreatitis

Presumptive (reportable to OHA)
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\(^1\), or
• a person with epidemiologic linkage to another probable or confirmed case or linkage to a community during an outbreak of mumps

Suspect (not reportable to OHA)
• Parotitis, acute salivary gland swelling, orchitis, or oophoritis
or
• A positive lab result with no mumps clinical symptoms (with or without epidemiological-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.)

3.2 Services Available (or not) at the Oregon State Public Health Laboratory
Currently OSPHL performs no test for mumps. WSPHL perform testing for mumps-specific IgM and IgG antibodies. In addition, WSPHL can perform viral culture and PCR for mumps on clinical speci-

Note that up to 10% of vaccinated individuals may remain IgM-positive even 6–9 months post vaccination.
mens (buccal and oropharyngeal swab preferred). If mumps is considered a real possibility, please contact ACDP epidemiologists to arrange testing at WSPHL. After the request has been approved, please collect the following information required by WSPHL: submitter, method of transport, expected specimen arrival date, tracking number, patient initials, DOB, rash onset date, specimen collection date, immunization history, specimen type(s), and test(s) requested. Persons suspected to have mumps should have serum drawn and specimens collected for viral isolation at the time of the first health care visit. For additional information regarding collection, storage and shipping of specimens, see: http://public.health.oregon.gov/LaboratoryServices/CommunicableDiseaseTesting/Documents/mumpssub.pdf

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, if an acute IgM is 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 prevent a fourfold rise in IgG titer in the convalescent serum specimen.

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. Urine samples may also contain virus; collection of both respiratory and urine samples can increase the likelihood of detecting virus. Unlike buccal and oral specimens, urine samples may not be positive for mumps virus until >4 days after symptom onset.

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 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 provide questions like “might the rash be due to antibiotics? Have you tested for other viruses”?

4.1 Identify the Source of Infection.

Try to determine if 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 symptoms. To have a reasonable chance of exposure, persons must 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, we will arbitrarily say that it must be more than 5 minutes—and will modify this threshold as better data become available.

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.
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 adequate 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: 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 for 5 days after illness onset. 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 the onset of 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 the onset of symptoms.

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

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

5.3 Protection of Contacts

1. Active Immunization

Preschool children and adults not at high risk should receive 1 dose of MMR; for children in grades K–12 and adults at high risk (i.e., persons who work in healthcare facilities, international travelers, and students at post-high-school educational institutions), 2 doses of MMR are recommended.

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.

2. Passive Immunization with Immune Globulin

IG is not effective; forget it.
6. MANAGING SPECIAL SITUATIONS

6.1 Control of Institutional Clusters

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

Offer MMR vaccine to persons without evidence of immunity.

During an outbreak and depending on the epidemiology of the outbreak (e.g., the age groups or institutions involved), a second dose of vaccine should be considered for adults and for children aged 1–4 years who have received one dose. The second dose can be administered as early as 28 days after the first dose.

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 (two times the maximum incubation period) after the date of illness onset in the last identified case.

Exclude persons without evidence of immunity to mumps from daycare 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.

6.2 Healthcare Settings

Isolation & Quarantine

Patient isolation. Do not allow suspect mumps cases to sit in waiting area for prolonged periods of time; and keep them more than three feet from other patients. Ask that they wear a surgical mask. Droplet precautions should be maintained for 5 days after the onset of 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 illness) 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 the onset of 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)

• Exposed healthcare workers with no documentation of mumps vaccination 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 not 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

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. During an outbreak of mumps, health-care facilities should recommend 2 doses of MMR vaccine for unvaccinated personnel born before 1957 who lack laboratory evidence of mumps immunity or laboratory confirmation of disease.

UPDATE LOG

April 2010. Changes included an adjusted period of communicability and an expanded lab recommendation to reflect new CDC recommendations. (Juventila Liko)
March 2011. Minor wordsmithing of case definitions. (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)
December 2012. Clarified LHD responsibilities regarding mumps testing at WSPHL. (Juventila Liko)
March 2013. Updated acceptable evidence of immunity. (Juventila Liko)
August 2013. Outbreak definition revised to be more in line with the national definition. (Juventila Liko)
September 2014. Added clarification about other potential diagnosis for mumps-like illnesses. (Juventila Liko)
February 2015. The lab section was updated to reflect the most recent OSPHL guidelines. (Juventila Liko)