

# Section of Epidemiology Mumps Investigation Guidelines

## 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 and may be first 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 only have nonspecific or respiratory symptoms only. As many as 20% of mumps infections are asymptomatic.

## Differential diagnosis

Mumps virus is the only cause of epidemic parotitis. Parotitis – especially sporadic cases – may be due to viruses other than mumps. Parotitis can also be caused by 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 50% of postpubertal males. Central nervous system (CNS) involvement is common but fewer than 10% have symptoms of CNS infection.

Other rare complications include arthritis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, thrombocytopenia, cerebellar ataxia, transverse myelitis, ascending polyradiculitis, pancreatitis, oophoritis, and hearing impairment.

Mumps during the first trimester is associated with an increased rate of spontaneous abortion, but 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

Unprotected face-to-face (<3 feet) contact with an infectious person for at least 5 minutes.

## Incubation period

Usually 16 to 18 days, but cases may occur 12 to 25 days after exposure.

## Period of communicability

Communicability is probably highest from 2 days before to 5 days after onset of parotitis; mumps virus has been isolated in saliva from 7 days before through 9 days after onset of swelling.

## Laboratory testing

Collection of a buccal specimen within 1 to 3 days of parotitis onset is optimal; however virus may be detected for up to 9 days after parotitis onset. **Mumps PCR is the method of choice for rapid clinical diagnosis through the Alaska State Virology Laboratory (ASVL).** ASVL will ship specimens by overnight service to a CDC contract lab in California for PCR testing.

Acute mumps infection may also be laboratory confirmed by the presence of serum mumps IgM, a significant rise in IgG antibody titer in acute- and convalescent-phase serum specimens, or positive mumps virus culture. However, mumps IgM response may be attenuated or absent in vaccinated persons making serologic confirmation difficult. In addition, studies have shown that individuals with detectable mumps IgG titers have still developed mumps infection. ASVL performs IgG antibody testing for immunity; IgM antibody testing or mumps culture is *not* available at ASVL. (Table 1).

**Table 1. Specimens for mumps testing submitted to ASVL**

Test	Mumps Virus
Testing Lab	Alaska State Virology Laboratory - Fairbanks
Disease(s)	Mumps, Orchitis
Organism(s)	Mumps Virus
Test Method	<b>Serology</b> (Mumps IgG Antibody) 1. This test is used to determine immune status. 2. Performed at ASVL via Multiplex Immunoassay <b>PCR</b> (Mumps Virus Nucleic Acid) 1. This test is used to determine active infection. 2. Testing will be performed at a CDC contract lab.
Specimen	<b>Serology</b> • Centrifuged serum in SST (serum separator tubes – tiger top, marble top or yellow top without additives) ; 1 mL minimum <b>PCR</b> 1. Buccal swab in Universal Transport Media (UTM). 2. Throat swab in UTM. (Swabs: use synthetic material swabs only – cotton or calcium-alginate tips and wooden or metal shafts are not acceptable)
Storage/Transport	<b>Serology</b> • Store refrigerated or frozen; indicate date frozen (if applicable) on requisition • Ship on frozen packs • Ambient temperature shipping is not recommended per reagent manufacturer guidelines <b>PCR</b> 1. Ship inoculated UTM to ASVL on cool packs (4°C). 2. ASVL will overnight the sample to the CDC Contract Lab.
Results	<b>Serology</b> 4. <b>Negative:</b> No IgG antibodies specific to Mumps detected. Presumed not to have had previous exposure to Mumps through infection or vaccination. 5. <b>Equivocal:</b> A borderline result. Obtain an additional specimen for retesting. 6. <b>Positive:</b> IgG antibody to Mumps detected. May indicate exposure to Mumps via infection or vaccination. <b>PCR</b> 1. Not Detected • Mumps Virus nucleic acid was not detected. 2. Detected • Mumps Virus nucleic acid was detected.
Turnaround Time	<b>Serology:</b> 1-3 days after receipt at ASVL <b>PCR:</b> 2 days from date of receipt at CDC Contract Lab.

# Section of Epidemiology Mumps Investigation Guidelines

## Specimen Collection

A buccal swab is the preferred specimen. A throat swab may also be collected. Specimens should be collected using a Dacron® or other synthetic swab\* on a plastic shaft. Place swab in a tube containing universal transport media (UTM) and ship on cold packs to ASVL. Specimens should be shipped on cold packs within 24 hours. If shipping is delayed, freeze at -70°C and ship frozen.

\*Swabs: use synthetic material swabs only – cotton or calcium-alginate tips and wooden or metal shafts are not acceptable.

CDC buccal fluid specimen collection guidance is available here:

<http://www.cdc.gov/mumps/lab/detection-mumps.html>

ASVL request forms are available at:

<http://www.dhss.alaska.gov/dph/Labs/Documents/publications/FbxSupplyReq.pdf>

Complete the patient and submitter information. In the Miscellaneous Viral Serology area, select Mumps, check patient is symptomatic. In the remarks box, write PCR testing.

Detailed ASPHL information available here:

<http://dhss.alaska.gov/dph/Labs/Pages/publications/default.aspx>

## Shipping Options

Specimen shipping should be coordinated with SOE.

- **Mail**  
Alaska State Viral Laboratory P.O. Box 60230  
Fairbanks, AK 99706-0230
- **Goldstreak** to ASVL in Fairbanks:  
Contact SOE at 269-8000 or ASVL at 371-1000 to advise of flight information and air bill number. A courier will pick up the specimen and deliver to ASVL.
- **Overnight delivery to the CDC Contract laboratory** (this must be pre-approved and coordinated with SOE and ASVL) via FedEx Next Day Air. SOE/ASVL will provide the FedEx account number to charge for the shipment. (Please Note: Do not schedule shipments on Friday for weekend delivery as the reference lab is not open on the weekends and cannot accept the delivery.)
  - Fax a copy of the completed (VPD) submittal form and FedEx shipping label to the California Department of Public Health Lab at (510) 307-8578.
  - Fax the ASVL laboratory request form and VPD submittal form to ASVL at (907) 474-4036.

- Be sure to place a copy of the completed (VPD) submittal form from the California Department of Public Health in the box that will be shipped via FedEx.
  - Ship to:  
California Department of Public Health  
Marina Bay Parkway  
Richmond, CA 94804  
ATTN: Specimen Receiving  
Phone: (510) 307-8585
- TAT for PCR is 2 business days from date of receipt at California. If PCR is positive, prelim report is generated and reflexes to genotyping. Genotyping TAT is ten business days from date of positive result at California. If it is negative, final report generated, and no further testing is necessary.

## Case definition

**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 immunoglobulin M (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 reverse transcription polymerase chain reaction (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

# Section of Epidemiology Mumps Investigation Guidelines

## **SOE reporting requirements**

- Healthcare providers must report suspected or probable mumps cases to the SOE promptly.
- Suspect, probable and confirmed cases are entered into AK-STARS.
- PHN or EPI nurse complete the mumps case report interview form:

[dhss.alaska.gov/dph/Epi/id/SiteAssets/Pages/Mumps/AKMumpsInterviewCombo10317.pdf](http://dhss.alaska.gov/dph/Epi/id/SiteAssets/Pages/Mumps/AKMumpsInterviewCombo10317.pdf)

EPI staff will enter mumps surveillance form data under *CDC form* tab in AK-STARS.

- Advise Immunization Program Manager
- FTR for outbreaks

## **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 effectiveness of 1 dose of mumps vaccine at approximately 80% (64%-95%) and two doses at 90% (88%-90%). However, in recent large outbreaks, mumps infections have occurred in many persons with a history of 2 doses of mumps vaccine and some studies indicate that vaccine-induced immunity may wane.

## **Postexposure prophylaxis (PEP)**

None. Neither mumps vaccine nor immune globulin (IG) is effective for mumps postexposure prophylaxis.

## **Case investigation**

1. Confirm clinical signs and symptoms of mumps.
2. Arrange for laboratory testing. Submit specimens to ASVL for testing, if feasible.
3. Ensure case isolation for 5 days after parotitis onset.
4. Interview the suspected case to determine the possible source 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.
5. Identify all household and other close contacts and assess their mumps immunity status. The recommended period for contact tracing is two days before through five days after parotitis onset.
6. Assess occupational status of household contacts; if any household member is a healthcare worker, see section on “Mumps in Healthcare Settings”.
7. Refer known susceptible contacts and contacts who’ve had only one dose of MMR vaccine or who have unknown MMR immunization status. 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.

8. If one confirmed case occurs in a childcare center or school, exposed persons who have had only one dose of MMR should be recommended to receive a second dose ( $\geq 28$  days after the first dose). In outbreaks among older children and adolescents, offering a third MMR dose to contacts with 2 documented MMR doses may be considered.

## **Mumps on College Campuses and Other Congregate Living Settings**

Notify SOE of any suspected mumps cases in college students. Mumps can spread quickly on college campuses 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.

Contacts who have only received 0 or 1 dose of MMR vaccine should be brought up to date. While MMR vaccination will not serve as post-exposure prophylaxis, it may protect against future exposures if transmission continues in the same setting.

The same approaches used on college campuses may be applied to other settings as well, e.g., jails, prisons, military barracks or other congregate living settings.

## **Mumps in Healthcare Settings**

Healthcare personnel with active mumps illness and those who lack evidence of immunity and have had unprotected exposures to mumps should be excluded from work from the 12th day after the first unprotected exposure to mumps through the 25th day after the last exposure. Exposure date is counted as day 0, and precautions may be removed on day 26. Unprotected exposures are defined as being within three feet of a patient with a diagnosis of mumps without the use of proper personal protective equipment. Irrespective of their immune status, all exposed healthcare personnel should report any signs or symptoms of illness during the incubation period, from 12 through 25 days after exposure. See:

<http://www.cdc.gov/vaccines/pubs/surv-manual/chpt09-mumps.html>

SOE Mumps Investigation Guidelines adapted from California Department of Public Health – March 2016. Available at: <https://archive.cdph.ca.gov/HealthInfo/discond/Documents/CDPHMumpsQuicksheet.pdf>