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>
<thead>
<tr>
<th>Test Method</th>
<th>Mumps Virus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serology</strong> (IgM Antibody)</td>
<td>1. The test is used to determine immune status. 2. The test is performed at ASVL by ELISA.</td>
</tr>
<tr>
<td><strong>PCR (Mumps Virus Nucleic Acid)</strong></td>
<td>1. This test is used to determine active infection. 2. Testing will be performed at a CDC contract lab.</td>
</tr>
<tr>
<td><strong>Buccal swab</strong></td>
<td>1. Buccal swab in universal Transport Media (UTM). 2. Throat swab in UTM. (Swabs use synthetic material swabs only – cotton or cotton-algodine tip and wooden or metal shafts are not acceptable).</td>
</tr>
<tr>
<td><strong>Storage/Transport</strong></td>
<td>Store refrigerated or frozen; indicate date frozen (if applicable) on requisition. Ship on frozen packs (preferred) or cold packs. Ambient temperature shipping is not recommended per reagent manufacturer guidelines.</td>
</tr>
<tr>
<td><strong>Serology</strong> (IgG Antibody)</td>
<td>1. IgG antibody titer greater than or equal to 270. 2. Specific IgA antibody titer greater than or equal to 30.</td>
</tr>
<tr>
<td><strong>PCR</strong></td>
<td>1. Not Detected 2. Detected</td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td>7-10 days</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>2 days from date of receipt at CDC Contract Lab.</td>
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Table 1. Specimens for mumps testing submitted to ASVL
**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 specimen collection guidance is available here:
http://www.cdc.gov/mumps/lab/detection-mumps.html

ASVL request forms are available at:

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 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

**SOE reporting requirements**
- Healthcare providers must report suspected or probable mumps cases to the SOE within 5 working days.
- Clusters or outbreaks of suspected or confirmed mumps are immediately reportable to the SOE.
- Suspect, probable and confirmed cases are entered into AK-STARS.
- PHN or EPI nurse complete the mumps surveillance form:
  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 (≥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 postexposure 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:

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](https://archive.cdph.ca.gov/HealthInfo/discond/Documents/CDPHMumpsQuicksheet.pdf)
Fast Facts about MUMPS

Symptoms
- Fever
- Headache
- Muscle aches
- Tiredness
- Loss of appetite
- Swollen and tender salivary glands under the ears or jaw on one or both sides of the face (parotitis)

Complications
Most people with mumps recover fully. However, mumps can occasionally cause complications, and some of them can be serious. Complications may occur even if a person does not have swollen salivary glands (parotitis) and are more common in people who have reached puberty.

Vaccination
The MMR (measles, mumps, and rubella) vaccine is the best way to prevent mumps. The MMR vaccine should be routinely given when children are 12-15 months old, and a second dose should be given when they are 4-6 years old. Two doses of the vaccine are more effective against mumps than one dose and prevent most, but not all, cases of mumps and mumps complications.

Complications of mumps can include
- Inflammation of the testicles (orchitis) in males who have reached puberty, which rarely leads to sterility
- Inflammation of the brain (encephalitis) and/or tissue covering the brain and spinal cord (meningitis)
- Inflammation of the ovaries (oophoritis) and/or breasts (mastitis) in females who have reached puberty
- Temporary or permanent deafness

Transmission
Mumps is spread by droplets of saliva or mucus from the mouth, nose, or throat of an infected person, usually when the person coughs, sneezes or talks. Items used by an infected person, such as cups or soft drink cans, can also be contaminated with the virus, which may spread to others if those items are shared. In addition, the virus may spread when someone with mumps touches items or surfaces without washing their hands and someone else then touches the same surface and rubs their mouth or nose.

Most mumps transmission likely occurs before the salivary glands begin to swell and within the 5 days after the swelling begins. Therefore, CDC recommends isolating mumps patients for 5 days after their glands begin to swell.

If you have mumps, there are several things you can do to help prevent spreading the virus to others:
- Minimize close contact with other people, especially babies and people with weakened immune systems who cannot be vaccinated.
- Stay home from work or school for 5 days after your glands begin to swell, and try not to have close contact with other people who live in your house.
- Cover your mouth and nose with a tissue when you cough or sneeze, and put your used tissue in the trash can. If you don’t have a tissue, cough or sneeze into your upper sleeve or elbow, not your hands.
- Wash hands well and often with soap, and teach children to wash their hands too.
- Don’t share drinks or eating utensils.
- Regularly clean surfaces that are frequently touched (such as toys, doorknobs, tables, counters) with soap and water or with cleaning wipes.

For more information call 800-CDC-INFO (800-232-4636) or visit www.cdc.gov/mumps