

Mumps

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Mumps is caused by an RNA virus in the genus *Rubulavirus* of the Paramyxoviridae family. This virus family also includes parainfluenza and Newcastle disease virus. Infection with parainfluenza and Newcastle disease viruses produces antibodies that cross react with mumps virus.

B. Clinical Description

Mumps is characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid gland(s). The parotid gland is located in the cheek area, at the back angle of the jaw, in front of the ear. Parotitis occurs in 30-40% of infected persons. Parotitis may be unilateral or bilateral. Symptoms tend to decrease after 1 week and usually resolve after 10 days. Nonspecific prodrome symptoms, including myalgia, anorexia, malaise, headache, and low-grade fever, may occur several days prior to salivary gland swelling. In the prevaccine era, 15-27% of infections were asymptomatic. In the post-vaccine era, it is difficult to estimate the number of asymptomatic cases, because it is unclear how vaccination modifies clinical presentation.

Not all cases of parotitis - especially sporadic ones - are due to mumps infection. Parotitis can also be caused by parainfluenza virus types 1 and 3, Epstein Barr virus, influenza A virus, Coxsackie A virus, echovirus, lymphocytic choriomeningitis virus, human immunodeficiency virus, and other noninfectious causes, such as drugs, tumors, immunologic diseases, and obstruction of salivary duct. However, these agents do not cause epidemic parotitis; only mumps causes epidemic parotitis.

Some complications of mumps occur more frequently among adults than among children. Orchitis (testicular inflammation causing pain, swelling, and tenderness) is the most common complication in post-pubertal males and in the post-vaccine era occurs in as many as 10% of post-pubertal males. In the pre-vaccine era, rates of orchitis occurred in up to 66% of cases. Rarely, it causes sterility.

Adults have a higher risk for complications resulting from mumps infection. Central nervous system involvement in the form of aseptic meningitis is common with mumps infections. Up to 10% of cases have symptomatic meningitis (headache and stiff neck) and 50 - 60% have asymptomatic aseptic meningitis (inflammatory cells in cerebrospinal fluid). As many as half of individuals with aseptic meningitis due to mumps do not have parotitis.

Severe complications of mumps are rare. Rare complications of mumps include arthritis, encephalitis, thyroiditis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, thrombocytopenia, cerebellar ataxia, transverse myelitis, ascending polyradiculitis,

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pancreatitis, oophoritis, sterility, and hearing impairment. Permanent sequelae and death are rare.

Some data suggest that mumps infection during the first trimester of pregnancy is associated with an increased rate of spontaneous abortion. Although mumps can cross the placenta, no evidence exists that this results in congenital malformation.

C. Reservoirs

Humans are the only known natural hosts. Persons with asymptomatic disease can transmit the virus, but no carrier state is known to exist.

D. Modes of Transmission

Mumps is transmitted by direct contact with respiratory droplets or saliva from an infected person. Mumps may be spread by freshly contaminated fomites.

E. Incubation Period

The average incubation period is 16-18 days, with a range of 12-25 days.

F. Period of Communicability or Infectious Period

The period of maximum communicability is from 1 to 2 days before onset of salivary gland swelling to 5 days after onset of salivary gland swelling. However, mumps virus has been isolated from saliva from 7 days before through 9 days after onset of parotitis. For disease investigation purposes, consider mumps cases infectious 2 days prior to salivary gland swelling through 6 days of swelling (5 days after swelling onset with the day of onset counted as day 0).

G. Epidemiology

Mumps occurs worldwide. The incidence of mumps remains high in countries where mumps vaccine has not been introduced. In the United States, the reported incidence of mumps declined after the introduction of mumps vaccine in 1967 and the recommendation for its routine use in 1977. In 1989, children began receiving two doses of mumps vaccine because of implementation of the two-dose MMR policy (for measles control), and mumps cases declined further.

In some years, there are more cases of mumps than usual because of outbreaks. A major factor contributing to outbreaks is being in a crowded environment, such as attending the same class, playing on the same sports team, or living in a dormitory with a person who has mumps. In highly vaccinated populations, most cases are likely to occur in fully vaccinated individuals.

In 2006, the largest mumps outbreak since 1987 occurred, with more than 6,000 cases reported in the United States. During the 2006 outbreak, 6 midwestern states reported the majority (84%) of the cases, and young adults aged 18 - 24 years were the most highly affected age group with many of the cases occurring among college students. Many of the cases had received one or two doses of MMR vaccine. During 2015-2016, an outbreak among mostly college students in Iowa accounted for more than 500 lab confirmed cases. Historically, the peak incidence of mumps was between January and May; however, seasonality is no longer evident in the United States. Over time, the age group with the most reported cases has shifted from children five to nine years of age to older individuals.

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Colorado mumps statistics are available on the CDPHE website:

<https://www.colorado.gov/pacific/cdphe/colorado-reportable-disease-data> .

2) CASE DEFINITION

Clinical Presentation

Parotitis or swelling of the sublingual or submandibular salivary glands for two or more days.

Mumps-Associated Complications

Among vaccinated persons, severe complications of mumps are uncommon but occur more frequently among adults than children. Complications can include: aseptic meningitis, encephalitis, hearing loss, orchitis (testicular inflammation), oophoritis (ovarian inflammation), mastitis (breast inflammation) or pancreatitis.

Laboratory Criteria for Diagnosis

- Detection of mumps nucleic acid (e.g., standard or real time RT-PCR assays), or
- Isolation of mumps virus from clinical specimen, or
- Detection of mumps IgM antibody, or
- Demonstration of specific mumps antibody response in absence of recent vaccination, either a four-fold increase in IgG titer as measured by quantitative assays, or a seroconversion from negative to positive using a standard serologic assay of paired acute and convalescent serum specimens.

Case Classification

Suspect: A case with clinically compatible illness or that meets the clinical case definition without laboratory testing, or a case with 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 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: 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; orchitis; oophoritis; mastitis; pancreatitis.

Note: A detailed travel history, including dates of travel and locations, is needed to classify mumps cases as internationally imported cases or US-acquired cases.

3) REPORTING CRITERIA

What to Report to the Colorado Department of Public Health and Environment (CDPHE) or local health agency

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- Suspect, confirmed, and probable cases of mumps.
- Cases should be reported using telephone, fax or the Colorado Electronic Disease Reporting System (CEDRS) to CDPHE or the local health department. See below for phone and fax numbers.
- All mumps cases should be reported within 7 days of clinical or laboratory diagnosis.
- Only confirmed and probable cases are reported to CDC.

Purpose of Surveillance and Reporting

- To identify cases for investigation and ensure laboratory testing if necessary.
- To promptly identify clusters and potential outbreaks of disease.
- To recommend vaccination in certain situations.
- To monitor trends in disease incidence.

Important CDPHE Web Resources, Telephone and Fax Numbers

- CDPHE Communicable Disease Branch
 - Phone: 303-692-2700 or 800-886-7689 x2700 or 800-866-2759 (voicemail)
 - Fax: 303-782-0338 or 800-811-7263
 - After hours: 303-370-9395
- CDPHE Molecular Sciences Laboratory: 303-692-3286
- Communicable Disease Manual (CD Manual) website:
<https://www.colorado.gov/pacific/cdphe/communicable-disease-manual>

4) LABORATORY TESTING

A clinical diagnosis of mumps may not be reliable, so efforts should be made to obtain clinical specimens (buccal swab, throat swab, urine, or CSF) for all sporadic cases, including suspect cases, and at least some cases in an outbreak at the time of the initial investigations. In some situations, additional testing of probable mumps cases with negative mumps laboratory results may be recommended. Confirmatory laboratory tests for acute mumps infection are mumps PCR, mumps IgM antibody, viral culture, or a significant rise in mumps IgG antibody titer between acute and convalescent serology specimens.

The interpretation of laboratory test results for persons suspected of having mumps may not be clear-cut, especially in previously vaccinated persons. Mumps IgM test results may be negative; IgG test results may be positive at initial blood draw and viral detection in RT-PCR or culture may have low yield in persons having previous contact with mumps virus either through vaccination (particularly with 2 doses) or natural infection. Therefore, clinically compatible mumps cases may not be ruled out by negative laboratory results. The decision to collect an additional specimen depends on the person's vaccination status, exposure history, and the timing of his/her initial specimen collection. Serologic tests should be interpreted with caution, as false positive and false negative results are possible with IgM tests.

A. Viral Detection (PCR)

Mumps PCR testing is available on a fee-for-service basis at the CDPHE laboratory and is also available at some commercial laboratories.

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Clinicians are strongly encouraged to collect a buccal swab for mumps PCR testing in patients with otherwise unexplained parotitis. **In order to optimize virus yield, emphasis should be placed on obtaining mumps clinical specimens from buccal mucosa within 1 to 3 days after onset of symptoms (usually parotitis).** Samples collected when the patient first presents with symptoms have the best chance of having a positive result by RT-PCR. Instructions for collecting a buccal swab are located on CDC's website at: <http://www.cdc.gov/mumps/lab/detection-mumps.html> .

A swab of the buccal mucosa/parotid duct or the duct of another affected salivary gland yields the best viral sample. Mumps virus may also be isolated from throat, urine and cerebrospinal fluid (CSF) specimens. Urine samples, however, are less likely than oral specimens to contain sufficient virus copies or virus infected cells for culture or detection by molecular methods, and therefore are not preferred. Clinical specimens should ideally be obtained within three days and not more than eight days after parotitis onset.

- **Vaccinated persons:** In order to optimize virus yield, emphasis should be placed on obtaining mumps clinical specimens from buccal mucosa within **1 to 3 days** after onset of symptoms (usually parotitis).
- **Unvaccinated persons:** Virus may be isolated from the buccal mucosa until 11-14 days after salivary enlargement; however, viral isolation is most likely to be successful just prior to and **within the first three days** of parotitis onset.

In the case of specimens for virus culture or PCR assay, immediately place specimens in a cold storage container and transport to the laboratory. **Please call 303-692-2700 to arrange for laboratory testing at the CDPHE lab.**

Molecular typing is recommended and can be performed by CDC because it provides important epidemiologic information and allows the building of a sequence database that will help track transmission pathways of mumps strains circulating in the United States.

B. Serology Testing

Mumps serology testing is widely available commercially and can also be requested from the CDC. The CDPHE laboratory does not perform any mumps serology testing.

At the initial visit, a serum specimen should be obtained to test for mumps IgM and IgG antibodies.

- If the acute-phase specimen is positive for IgM, a second specimen is not necessary.
- A second negative IgM does not rule out mumps unless the IgG result is also negative.

Paired serum specimens may also be used to demonstrate seroconversion from negative to positive from acute to convalescent, which is considered a positive diagnostic result for mumps. In unvaccinated individuals, a four-fold increase in IgG titers is also considered a positive diagnostic result for mumps, but these are rarely done.

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IgM testing- serum collection and timing of the mumps IgM response:

- **Vaccinated persons:** Patients that mount a secondary immune response to mumps, as seen in most previously vaccinated persons, may not have an IgM response or it may be transient and not detected depending on the timing of specimen collection. Because of this, a high number of false negative results may occur in previously vaccinated individuals. False positive IgM results may also occur and appear to be more prevalent with certain IgM test formats, such as the IFA. There is some evidence that serum collected ≥ 10 days after parotitis onset may improve the ability to detect IgM among persons who have received one or two doses of MMR vaccine. However, persons with a history of mumps vaccination may not have detectable mumps IgM antibody regardless of the timing of specimen collection.
- **Unvaccinated persons:** IgM antibody is detectable within 5 days after onset of symptoms, reaches a maximum level about a week after onset, and remains elevated for several weeks or months. If an acute-phase serum sample collected ≤ 3 days after parotitis onset is negative for IgM, testing a second sample collected 5-7 days after symptom onset may be recommended since the IgM response may require more time to develop.

IgG testing-diagnosis of mumps with IgG

IgG testing for laboratory confirmation of mumps requires the demonstration of seroconversion from negative to positive by EIA or a four-fold rise in the titer of antibody against mumps as measured in plaque-reduction neutralization assays or similar quantitative assays. The tests for IgG antibody should be conducted on both acute- and convalescent-phase specimens at the same time. The same type of test should be used on both specimens. EIA values are not titers, and increases in EIA values do not directly correspond to titer rises.

The convalescent specimen for IgG testing should be collected 2-3 weeks after the person's swelling onset.

- **Unvaccinated persons:** In unvaccinated persons, IgG antibody increases rapidly after onset of symptoms and is long lasting.
- **Vaccinated persons:** In vaccinated persons, the IgG may already be quite elevated in the acute-phase blood sample which frequently prevents detection of a four-fold rise in IgG titer in the convalescent serum specimen.

A single serum sample tested for mumps-specific IgG is not useful for diagnosing acute mumps infections. The presence of mumps-specific IgG, as detected using a serologic assay (EIA or IFA), is considered evidence of mumps immunity.

C. Other tests

If the health care provider is uncertain about the diagnosis of mumps, the provider may elect to test for other infections, such as mononucleosis or streptococcal pharyngitis if the patient's symptoms are compatible with one of these illnesses.

D. State Laboratory Testing Services

- Mumps PCR testing is available at the CDPHE Lab on a fee-for-service basis. Mumps PCR is also available at some commercial laboratories.

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- Mumps IgM and IgG testing is widely available at commercial laboratories.
- With approval from CDPHE Communicable Disease staff, specimens may be submitted to the CDPHE Lab to be sent to the CDC Lab for mumps testing. The CDC Lab offers mumps IgM antibody testing and viral culture. A viral culture may be done at the CDC Lab if the PCR result is positive.

5) CASE INVESTIGATION

Investigate all mumps reports, including suspect cases.

A. Case Investigation / Forms

- Organized health departments have primary responsibility for investigating cases in their jurisdiction.
- Public health nursing services should consult their CDPHE Field Epidemiologist to establish primary responsibility for investigating cases in their jurisdiction.
- Use the extended record tab in CEDRS or the CDC Mumps Surveillance Worksheet https://www.colorado.gov/pacific/sites/default/files/DC_CD-Mumps-Monitoring-Worksheet.pdf during the investigation to ensure collection of pertinent information. The worksheet and instructions for completing the worksheet are available on the CD Manual website.
- In addition to the questions on the worksheet, ask whether the case's swelling was unilateral or bilateral, and if the case had fever or malaise.
- Attempt to obtain a mumps immunization record for all cases, especially cases < 25 years of age. If possible, the vaccination history should include vaccination date, type of vaccine, vaccine manufacturer, and lot number.
- Interview the case's health care provider. Determine whether the case had swollen salivary glands and which glands were swollen. Ask about demographic information, other symptoms, vaccine history, travel history, occupation, and whether specimens were collected for mumps testing.
- If specimens were not collected for mumps testing, recommend specimen collection for mumps testing, unless the case is a direct contact to a confirmed case. See Section 4 for details regarding laboratory testing.
- Interview the case or case's guardian to collect all the pertinent information. See section B. Identify and Evaluate Contacts for additional questions to ask during the interview regarding contacts.
- If multiple attempts to obtain case information are unsuccessful (e.g., the case, case's guardian, or health care provider does not return your calls, or the person refuses to divulge information), contact your CDPHE Vaccine Preventable Epidemiologist to discuss the situation.
- Determine whether the case's symptoms are compatible with mumps.
- If the case's symptoms are compatible with mumps, enter all information from the worksheet into CEDRS.
- If the case's symptoms are compatible with mumps, recommend exclusion from school, child care, and/or work for 5 days beyond the day of swelling onset (day of onset is counted as day 0).

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- In some low-risk employment situations, the case may be allowed to work if he/she can be functionally isolated at work (adequately separated from other individuals by at least 3 feet).

B. Identify and Evaluate Contacts

The main purpose of identifying contacts is to determine their mumps immunity status and educate them about mumps symptoms.

- Identify household and other close contacts.
- Obtain information about the case's close contacts (household, relatives, significant other, friends, etc.) and the case's activities (school, child care, work, church, social gatherings, travel) during the case's infectious period.
- Ask if the case knows anyone else with mumps symptoms. If other contacts have mumps symptoms they should be investigated as suspect mumps cases.
- Record names, ages, county (city or address) and phone numbers of all close contacts.
- For each activity, record the facility's name, phone number and a contact person.
- Information about contacts and activities occurring outside the investigator's county/area should be given to the appropriate county health department or CDPHE.
- CDPHE should be notified of all out-of-state close contacts.
- Close contacts or their guardian should be interviewed to determine if the contact is immune to mumps using the criteria listed below.

Presumptive evidence of mumps immunity includes one of the following:

- a. documentation of adequate vaccination (described below),
- b. laboratory evidence of immunity,
- c. birth before 1957, or
- d. documentation of physician-diagnosed mumps.

Adequate vaccination for preschool-aged children and adults not at high risk is one dose of live mumps virus vaccine administered on or after the first birthday. Adequate vaccination for school-aged children (i.e., grades K-12) and for adults at high risk (i.e., persons who work in health care facilities, international travelers, healthcare personnel and students at post-high school educational institutions) is 2 doses of live mumps vaccine administered on or after the first birthday, with a minimum interval of 28 days between the 2 doses. See section 6.4 for more details about healthcare personnel.

Health care facilities should consider routinely recommending 1 dose of mumps vaccine for unvaccinated workers born prior to 1957, since birth before 1957 is only presumptive evidence of immunity.

During a mumps outbreak, consider recommending a second dose of mumps virus vaccine for children 1-4 years of age and adults at low risk if they are affected by the outbreak. In addition, during a mumps outbreak recommend 2 doses of mumps vaccine for health care workers born before 1957 without other evidence of mumps immunity.

C. Reported Incidence is Higher than Usual / Outbreak Suspected

Call the CDPHE Communicable Disease Branch if there are a higher number of cases in your area than usual or an outbreak is suspected. A mumps outbreak is defined as 3 or more

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epidemiologically linked cases. For additional vaccination recommendations during a mumps outbreak see the presumptive evidence of mumps immunity information in Section 5 B. Identify and Evaluate Contacts.

6) DISEASE CONTROL MEASURES

A. Treatment

There is no specific treatment for mumps, only supportive care.

B. Prophylaxis

There is no prophylaxis for mumps infection. Receiving mumps vaccine after exposure will not prevent infection. Mumps vaccine may be recommended to prevent infection from future exposures. Recommend mumps vaccine for susceptible contacts, as they may not have been exposed but may be exposed to a secondary mumps case.

C. Education

- Advise contacts of signs and symptoms of mumps and to contact a health care provider if they develop symptoms.
- Recommend contacts review their MMR vaccination status and receive MMR vaccine if susceptible.
- The CDPHE sample letter, Mumps Alert, Important Notice to Parents <https://www.colorado.gov/pacific/cdphe/mumps-information-health-care-and-public-health-professionals>, located on the CD Manual website, includes information about mumps symptoms, contacting a health care provider if symptoms develop, and vaccine recommendations.
- A mumps fact sheet, Facts about Mumps https://www.colorado.gov/pacific/sites/default/files/DC_ComDis_VPD-Facts-about-Mumps.pdf, is located on the CD Manual website.
- Additional educational materials are available on the CDC Mumps website at <http://www.cdc.gov/mumps/about/index.html>.
- A Health Alert Network (HAN) Advisory about mumps may be sent to health care providers during a mumps outbreak. Sending a mumps HAN should be discussed with your CDPHE Vaccine Preventable Epidemiologist, who may assist you in developing the notice.

D. Managing Special Situations

1. Patients and Staff in Health Care Facilities (Hospitals and Long Term Care Facilities)

Hospitals and long term care facilities generally have written infection control policies and procedures for handling cases of communicable disease among patients and staff members. Prevention and control strategies should be applied in all healthcare settings, including outpatient and long-term care facilities. In brief, these measures include:

1. implementation of droplet precautions, in addition to standard precautions, for 5 days beyond the day of swelling onset (day of onset is counted as day 0) for patients or residents with mumps.
2. isolation of patients in whom mumps is suspected
3. assessment of presumptive evidence of immunity of healthcare personnel, including documented administration of two doses of live mumps virus vaccine, laboratory evidence of immunity or laboratory confirmation of disease, or birth before 1957

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4. vaccination of those without evidence of immunity,
5. exclusion of healthcare personnel with active mumps illness, as well as healthcare personnel who do not have presumptive evidence of immunity who are exposed to persons with mumps

An effective vaccination program is the best approach to prevent healthcare-associated mumps transmission. Healthcare Infection Control Practices Advisory Committee (HICPAC) and CDC have recommended that secure, preferably computerized, systems should be used to manage vaccination records for healthcare personnel so records can be easily retrieved as needed. Facilities are also encouraged to review employee evidence of immunity status for mumps and other vaccine preventable infections. Healthcare facilities should provide MMR vaccine to all personnel without evidence of mumps immunity at no charge.

Healthcare personnel: presumptive evidence of immunity

The presumptive evidence of immunity criteria for healthcare personnel differ slightly from the criteria for community settings. The following criteria should be followed to assess presumptive evidence of immunity among healthcare personnel:

- Written documentation of vaccination with two doses of live mumps or MMR vaccine administered at least 28 days apart
- Laboratory evidence of immunity
- Laboratory confirmation of disease
- Birth before 1957

In the event that a nosocomial outbreak occurs, healthcare facilities should have a plan in place for the implementation of the two-dose recommendation for all healthcare personnel, including those who were born before 1957 and lack laboratory evidence of immunity or laboratory confirmation of disease. Healthcare facilities may choose to proceed with appropriate assessment and vaccination of personnel born before 1957 before an outbreak occurs.

Although there are no data that correlate levels of serum antibody with protection from disease, presence of mumps-specific IgG antibodies is considered evidence of mumps immunity. For healthcare personnel who do not have adequate presumptive evidence of mumps immunity, prevaccination antibody screening before MMR vaccination is not necessary.

Healthcare personnel exclusion

Healthcare personnel with active mumps illness should be excluded immediately. 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.

- Previously unvaccinated health care personnel who receive their first dose of mumps vaccine after an exposure are considered non-immune and should be excluded from work.
- Exposed health care workers with history of one dose of mumps vaccine should receive a second dose as soon as possible, but no sooner than 28 days after the first dose. These employees may continue working as long as they are asymptomatic.

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- 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 personnel **should be educated about symptoms of mumps, including nonspecific presentations** (such as upper respiratory infection symptoms or fever even in the absence of salivary gland swelling), and **should notify occupational health if they develop these symptoms.**

2. Child care / Preschool

Refer child care providers to the Colorado Department of Public Health and Environment guidelines for child care providers **Infectious Disease in Child Care and School Settings: Guidelines for Child Care Providers**

(https://www.colorado.gov/pacific/sites/default/files/DC_ComDis-Infectious-Diseases-in-Child-Care-and-School-Settings.pdf) or the mumps fact sheet, Facts about Mumps

https://www.colorado.gov/pacific/sites/default/files/DC_ComDis_VPD-Facts-about-Mumps.pdf , for additional mumps information. Each situation should be evaluated

individually. Determine the dates the mumps case attended child care while infectious and who may have been exposed to mumps at the facility.

- Exclude the case from child care/preschool for 5 days beyond the day of swelling onset (day of onset is counted as day 0).
- Consider excluding susceptible close contacts.
- Advise parents of the signs and symptoms of mumps, to contact a health care provider if their child develops symptoms, and to review their child's immunization record.
- Inform staff about the signs and symptoms of mumps, contacting their health care provider if they develop symptoms and reviewing their immunization records.
- **The CDPHE sample letter, Mumps Alert, Important Notice to Parents** <https://www.colorado.gov/pacific/cdphe/mumps-information-health-care-and-public-health-professionals> , may be used to notify staff and parents of students. Child care staff and/or the health department personnel should review the MMR immunization records of all children and staff at the facility. If unable to review records for the whole facility, review the immunization records of the children and staff in the exposed classroom.
- Child care staff and/or health department personnel should contact the parents of children not up to date on their MMR vaccinations and refer them to their health care provider or the local public health agency for immunization.
- Child care personnel should monitor children and staff at the facility for mumps symptoms.
- Exposed contacts with symptoms of mumps should be seen by a health care provider and tested for mumps as appropriate. Testing of all cases is not necessary during an outbreak.
- During a mumps outbreak, consider recommending a second dose of mumps vaccine for children 1-4 years of age and staff members with only one dose of mumps vaccine.

3. School

Refer school personnel to the CDPHE **Infectious Disease Guidelines for School Personnel** (https://www.colorado.gov/pacific/sites/default/files/DC_ComDis-Infectious-Diseases-in-Child-Care-and-School-Settings.pdf) or the mumps fact sheet, Facts about Mumps

https://www.colorado.gov/pacific/sites/default/files/DC_ComDis_VPD-Facts-about-

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[Mumps.pdf](#), for additional information. Each school situation should be evaluated individually. Determine the dates the mumps case attended school while infectious and who may have been exposed to mumps at the school.

- Exclude the case from school for 5 days beyond the day of swelling onset (day of onset is counted as day 0).
- Consider excluding susceptible close contacts.
- Notify the school nurse, health aide or person responsible for health issues at the school (secretary, principal, etc.) about the case and discuss possible school exposures and disease control strategies.
- Determine whether the case is with one group of classmates all day or attends multiple classes with different students.
- Determine whether the case is involved in extra-curricular school activities, such as sports teams, clubs, etc.
- Advise parents, students, and staff of the signs and symptoms of mumps, to contact their health care provider if symptoms develop, and to review their immunization records.
- The CDPHE sample letter, Mumps Alert, Important Notice to Parents <https://www.colorado.gov/pacific/cdphe/mumps-information-health-care-and-public-health-professionals>, may be used to notify staff and parents of students. This sample letter is located on the CD Manual website.
- School staff and/or health department personnel should review the MMR immunization records of all children and staff at the facility. If unable to review records for the whole facility, review the immunization records of the students and staff in the exposed classroom(s).
- School and/or health department personnel should contact staff members and the parents of children not up to date on their MMR vaccinations and refer them to their health care provider or the local public health agency for immunization.
- School personnel should monitor students and staff at the facility for mumps symptoms.
- Exposed contacts with symptoms of mumps should be seen by a health care provider and tested for mumps as appropriate. Testing of all cases is not necessary during an outbreak.
- During a mumps outbreak, consider recommending a second dose of mumps vaccine for staff members who have previously received one dose of mumps vaccine.
- During a mumps outbreak, students with zero doses of MMR vaccine and with no other evidence of mumps immunity should be excluded from affected schools/colleges or other schools that are unaffected but deemed by local public health authorities to be at risk for transmission of disease.
- Students excluded during an outbreak can be readmitted immediately after they are vaccinated. Students who have a history of one dose of MMR vaccination should receive their second vaccine dose and be allowed to remain in school. Students who have been exempted from mumps vaccination for medical, religious, or other reasons should be excluded until the 26th day after the onset of parotitis in the last person with mumps in the affected school.

4. College

- If the college has a student health center, contact the student health center nurse or director to notify him/her of the case and discuss disease control measures.

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- If the college does not have a student health center, contact the Student Services or Administration Office to locate a contact person for campus health-related issues and the tracking of students' immunization records.
- Determine the case's living arrangements, such as whether the case lives in a dormitory, has roommates, eats in a dining hall, uses a common bathroom, etc.
- If the case lives in a residence hall, discuss with the case, student health center staff, or college administration how to isolate the case during his/her infectious period, especially if the case's roommates are susceptible to mumps. Possible options would include the case moving off campus, such as their parent's home, or moving to a single room and having meals delivered to the room by someone immune to mumps.
- Consider excluding susceptible close contacts.
- Determine whether the college requires students to have 2 MMR vaccinations or an exemption to vaccination. Students attending Colorado colleges with residence hall facilities are required to have 2 MMR vaccinations or an exemption to vaccination if they are "traditional" (traditional as defined by each institution) college students born after 1956.
- If the college has students' immunization records, ask about the immunization status of the student population, such as the number with 2 mumps vaccinations, 1 mumps vaccination, exemption to vaccination, and in-process of obtaining vaccination.
- During a mumps outbreak, students with zero doses of MMR vaccine and with no other evidence of mumps immunity should be excluded from affected schools/colleges or other schools that are unaffected but deemed by local public health authorities to be at risk for transmission of disease.
- Students excluded during an outbreak can be readmitted immediately after they are vaccinated. Students who have a history of one dose of MMR vaccination should receive their second vaccine dose and be allowed to remain in school. Students who have been exempted from mumps vaccination for medical, religious, or other reasons should be excluded until the 26th day after the onset of parotitis in the last person with mumps in the affected school.
- Many college student health centers routinely offer MMR vaccine to students. Colleges may conduct a MMR vaccination clinic in response to a student or staff member with mumps.
- Notices may be distributed in the case's classes to educate classmates and staff about mumps symptoms, the importance of seeing a health care provider if symptoms develop, the vaccine recommendations, and who to contact for vaccination. The CDPHE sample letter, Mumps Alert, Important Notice to Parents <https://www.colorado.gov/pacific/cdphe/mumps-information-health-care-and-public-health-professionals>, or the mumps fact sheet, Facts about Mumps https://www.colorado.gov/pacific/sites/default/files/DC_ComDis_VPD-Facts-about-Mumps.pdf, which are available on the Communicable Disease Manual website may be modified for this purpose.
- Campus publications, such as newspapers, or email notifications may be used to more broadly notify the campus of a case and heighten awareness of mumps.
- Notices may be posted in the dormitory and/or cafeteria if the case lives in a dormitory.
- Surveillance for mumps should be enhanced. The diagnosis of mumps should be considered when students with salivary gland swelling are seen at the college student

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ISSUED: 12/23/2009

REVISED: 06/08/2016

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health center. Students suspected of having mumps should be tested. If the college does not have a student health center, college staff and residential hall advisors could be asked to notify the person in charge of campus health-related issues if they are aware of students with facial swelling suggestive of mumps.

E. Environmental Measures

- No specific environmental measures are recommended.

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