

New Jersey Dept. of Health and Senior Services
Vaccine Preventable Disease Program
Mumps Clinical FAQs

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RECENT MUMPS CASES IN NEW JERSEY

[UPDATED] Is there currently a mumps outbreak in NJ?

Yes. In July 2009, the largest U.S. mumps outbreak since 2006 has occurred, with approximately 3500 cases reported in multiple locations, including NY and NJ. As of June 1, 2010, 405 cases have been reported in NJ. The outbreak has primarily remained confined to a tradition-observant religious community and the majority of ill persons have been vaccinated with a mumps-containing vaccine.

Is the mumps virus circulating in New Jersey and New York in 2010 different from the usual mumps strain?

No, the same strain has caused past outbreaks in the United States and the United Kingdom. The current MMR vaccine covers this strain.

Some people who have had both doses of the recommended MMR vaccine (to protect against measles, mumps, and rubella disease) are still getting mumps. Does that mean that the vaccine is not effective?

No, the mumps vaccine is effective. During outbreaks, we know that the people who have not been vaccinated against mumps have a much greater chance of getting mumps than those who are vaccinated. As with any vaccine, not everyone who is vaccinated will develop immunity and be protected. For the mumps vaccine, 90% of people will be protected after receiving the recommended 2 vaccines but about 10% of individuals will not develop immunity and remain susceptible. So we expect that during an outbreak when many, many people are being exposed every day, some people will get the mumps. The following example will explain this further.

- After 2 doses of the mumps vaccine, 90% of people will be protected, 10% will not be protected.

- This means out of every 100 people vaccinated, 90 will be protected. However, the vaccine will not "take" in 10 people, and these people will remain susceptible to the disease.
- By comparison, the measles vaccine (also part of the MMR vaccine) is about 98% effective and the annual influenza vaccine is about 70-85% effective.

Example 1:

In a community of 100 people, 100% have been vaccinated. Everyone is exposed to mumps. What happens?

- 90 people (90%) in the community are protected by the vaccine and do not get mumps.
- 10 people (10%) in the community become ill with mumps because the vaccine did not "take".
- Of the 10 people who get mumps, all (100%) have been vaccinated.

Example 2:

In a community of 100, 98% have been vaccinated. That means 98 people are vaccinated and 2 people are not. Everyone is exposed to mumps. What happens?

- 88 people (90% of the 98 who are vaccinated) in the community are protected by the vaccine and do not get mumps.
- 10 people (10% of the 98 who are vaccinated) become ill with mumps because the vaccine did not "take".
- 2 people who have never been vaccinated get ill because they have no immunity to the disease.
- Of the 12 (10 vaccinated +2 unvaccinated) people who get mumps, 83% (10/12) were vaccinated.

Thus a large percent of the people with mumps have been vaccinated. This is expected in a highly vaccinated population when dealing with a vaccine that

is 90% effective and a contagious disease like mumps. This does not mean that the vaccine is not working; in fact the mumps vaccine is working as expected. Most people who are vaccinated are not getting sick. You have to remember that during outbreaks many, many people are exposed every day – 90% of them are not getting sick because they have been protected by the vaccine.

Is there any recommendation to give a third dose of MMR?

No. The CDC is currently evaluating the use of a 3rd dose in highly vaccinated populations under an IRB protocol.

DISEASE DESCRIPTION

What is the clinical case definition of Mumps?

An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland(s), lasting at least 2 days, and without other apparent cause. [The case definition for mumps was approved by the Council of State and Territorial Epidemiologists (CSTE) in 2008.]

What are clinically compatible illnesses?

Infection with mumps virus may present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis or other salivary gland swelling, mastitis or pancreatitis.

What are the case classifications?

Suspected: A case with clinically compatible illness or that meets the clinical case definition without laboratory testing or a case with laboratory tests suggestive of mumps without clinical information.

Probable: A case that meets the clinical case definition without laboratory confirmation and is epidemiologically linked to a clinically compatible case.

Confirmed: A case that: 1) meets the clinical case definition or has clinically compatible illness, and 2) is either laboratory confirmed or is epidemiologically linked to a confirmed case.

What are the laboratory criteria for diagnosis?

- Isolation of mumps virus from clinical specimen, or
- Detection of mumps nucleic acid (e.g., standard or real time RT-PCR assays), or
- Detection of mumps IgM antibody, or

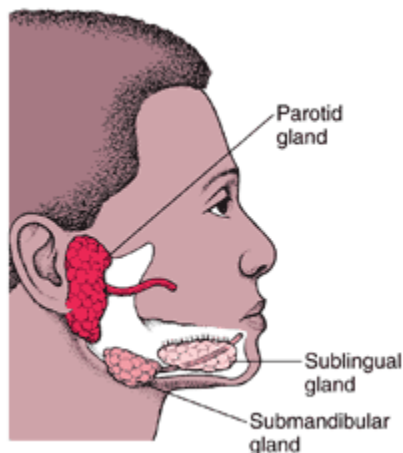
- Demonstration of specific mumps antibody response in absence of recent vaccination, either a four-fold increase in IgG titer as measured by quantitative assays, or a seroconversion from negative to positive using a standard serologic assay of paired acute and convalescent serum specimens.

What causes mumps?

Mumps is a viral illness caused by a paramyxovirus of the genus Rubulavirus.

What are the clinical manifestations of mumps?

The classic symptoms of mumps include parotitis in about 50% either unilateral or bilateral, which develops an average of 16 to 18 days after exposure. Swelling can also be seen in the submandibular and sublingual gland in a small percentage. Nonspecific symptoms including myalgia, anorexia, malaise, headache, and low-grade fever may precede parotitis by several days. As many as 40%–50% of mumps infections are associated with nonspecific or primarily respiratory symptoms, particularly among children less than 5 years of age. Only 30-40% of mumps infections produce typical acute parotitis. In 15-20% of infections, cases are asymptomatic.



From [The Merck Manual of Medical Information – Second Home Edition](#), p. 667, edited by Mark H. Beers.

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Are there other causes of parotitis?

Yes, but only mumps causes epidemic parotitis. Parotitis can also be caused by bacteria and by parainfluenza virus types 1 and 3, influenza A virus, Coxsackie A virus, echovirus, lymphocytic choriomeningitis virus, and

human immunodeficiency virus. Non-infectious causes include drugs, tumors, immunologic diseases, and obstruction of the salivary duct.

What complications can be caused by mumps?

Severe complications of mumps are rare. However, mumps can cause acquired sensorineural hearing loss in children; incidence is estimated at 1 in 20,000 cases. Mumps-associated encephalitis occurs in < 2 per 100,000 cases and approximately 1% of encephalitis cases are fatal.

Some complications of mumps are known to occur more frequently among adults than among children. Adults have a higher risk for mumps meningoencephalitis than children. In addition, orchitis occurs in up to 30-40% of cases in post pubertal males. Although it is frequently bilateral, it rarely causes sterility. Mastitis has been reported in as many as 31% of female patients older than 15 years who have mumps. Other rare complications of mumps are oophoritis and pancreatitis. Aseptic meningitis occurs in 10% of cases and is associated with a good prognosis. Although mumps infection in the first trimester of pregnancy may result in fetal loss, there is no evidence that mumps during pregnancy causes congenital malformations. Permanent sequelae such as paralysis, seizures, cranial nerve palsies, aqueductal stenosis, and hydrocephalus are rare, as are deaths due to mumps.

What is the incubation period and period of infectiousness?

The average incubation period for mumps is 16-18 days, with a range of 12–25 days. Fever may persist for 3–4 days and parotitis, when present, usually lasts 7–10 days. Persons with mumps are usually considered most infectious from 1-2 days before until 5 days after onset of parotitis.

How is the mumps virus transmitted?

The mumps virus replicates in the upper respiratory tract and is spread through direct contact with respiratory secretions or saliva or through fomites. In health care settings, patients should be placed in droplet precautions in addition to standard precautions.

VACCINE ISSUES

Should an IgG be drawn after two doses of MMR?

No. It is not necessary to draw an IgG after vaccines to confirm immunity.

Is there any danger to a person receiving additional vaccine (e.g., they have received MMR but can not find documentation)?

There is no danger to a person if he/she receives additional vaccine or if he/she has actually had the disease in the past and then receives vaccination.

How long does it take to develop MMR immunity?

In general, it takes 10-14 days to mount a response to a vaccine if it is the body's first exposure. Then it takes approximately seven days after the second exposure.

Is there risk to a newborn of a susceptible mom?

If the mother develops disease, the newborn is susceptible and can develop disease. If the mother has had disease in the past, maternal antibody is transferred across the placenta and may protect infants from developing mumps during the first year of life. Since the vaccine is not administered before 12 months of age, symptomatic mothers should use standard and droplet precautions. The virus is not believed to be transmitted through breast milk.

If someone is exposed to Mumps, would the vaccine prevent the disease?

Not everyone who is exposed to someone with mumps will get sick. If a person has been vaccinated with two doses of mumps vaccine, it is very unlikely they will get mumps. However, if a person hasn't been vaccinated, it is possible he/she could get sick and they should watch for symptoms of mumps. Additionally, if a person hasn't been age-appropriately vaccinated or isn't sure whether he/she is age-appropriately vaccinated, this is a good time to get a dose of mumps vaccine, and to make sure that everyone else in the house where he/she lives is also vaccinated. Mumps vaccine has not been shown to be effective in preventing disease after exposure, but vaccination of exposed susceptible persons will reduce the risk of disease from possible future exposures. If symptoms develop (generally 16-18 days after exposure), the person should not go to school or work for at least 5 days and should contact their medical provider.

SPECIMEN COLLECTION AND MANAGEMENT

Who should be tested for suspected mumps infection?

Clinical diagnosis of mumps may be unreliable, suspected cases of mumps should be laboratory confirmed. As with any disease, lab work should be

used in conjunction with clinical presentation (signs and symptoms). The recommendation to laboratory confirm all cases will be re-evaluated as the outbreak progresses.

It is difficult to interpret serology in people who have been vaccinated. Mumps should not be ruled out in someone with negative laboratory tests who is vaccinated if they have symptoms consistent with mumps. A detailed investigation should be conducted for each case with emphasis on accurate and complete immunization history. Recent outbreaks have included many cases who had already received at least one dose of mumps-containing vaccine.

What specimens should be collected from patients meeting the clinical case definition?

CDC recommends that a blood specimen and buccal/oral swab be collected from all patients with clinical features compatible with mumps.

What is the gold standard for laboratory confirmation of mumps?

Viral culture. Laboratories are strongly encouraged to perform cell culture isolation of mumps from buccal/oral swabs specimens. Detection of mumps in culture can be done using immunofluorescent antibody staining or standard RT-PCR.

When is the best time to collect clinical specimens?

Among unvaccinated persons, if an acute IgM is collected 3 or less days after onset of parotitis and the IgM is negative, a second serum sample (collected 5-7 days after onset) is recommended. Buccal/oral swabs should also be collected at first contact. Comment: unvaccinated persons include those with unknown vaccination history, and those with or without a history of mumps disease- older persons or foreign nationals may have detectable mumps IgG due to a previous subclinical infection.

Persons with a history of documented mumps vaccination, regardless of timing of collection, may not have detectable IgM. Buccal samples have the best chance of containing virus when collected on day 1-3 of onset of parotitis.

How should specimens be collected and managed?

Serologic testing:

Collect 7-10 ml of blood in a red top or serum separator tube (SST). Store and ship specimens cold (using ice packs).

Acute serum:

Collect within 5 days after symptom onset (at time of diagnosis)

Convalescent serum:

Collect within 2-3 weeks after symptom onset

Mumps viral samples:

Collect buccal swab or throat swab as soon as mumps is suspected. Samples may be positive in unvaccinated persons out to 9 days post onset, however among suspected cases that have received 1 or more doses of MMR, virus may be cleared much earlier. A commercial product designed for collection of throat cultures or a plain Dacron swab can be used for the collection of the buccal swab or throat swab (see information below regarding addition of fluids to keep swab moist). Synthetic swabs are preferred over cotton swabs which may contain substances that are inhibitory to enzymes used in RT-PCR.

Parotid Gland/Buccal Swab: May provide the best viral sample. Massage the parotid gland area (the space between the cheek and teeth just below the ear) for about 30 seconds prior to collection of the buccal secretions. The parotid duct (Stensen's duct) drains in this space near the upper rear molars. A throat swab (oropharyngeal or nasopharyngeal swab) can also be collected and added together with the buccal swab.

Place swab in a tube containing 2-3 mls of viral transport medium or cell culture medium (MEM or Hanks Balanced Salt Solution) or other sterile isotonic solution (phosphate buffered saline). The presence of protein, for example 1 percent bovine albumin, 0.5 percent gelatin, or 2 percent serum, stabilizes the virus which otherwise loses 90-99 percent infectivity within 2 hours at 4C in a protein-free medium.

Keep samples cold (4C). If there is more than 1 day delay in shipping the samples to the state lab or CDC for testing, the buccal swab or throat swab is best preserved at -70C. Ship the viral specimens using ice packs or dry ice*. Avoid freeze-thaw cycles.

*If shipment contains both serum and viral samples, ship together by overnight service on cold packs (do not freeze serum).

LINK: “Detection of Mumps Virus by Culture and Polymerase Chain Reaction (PCR)” http://www.cdc.gov/mumps/downloads/detection_IL.pdf

LABORATORY RESULTS

Serology

- **IgM:** Mumps is confirmed using mumps IgM antibody testing of serum samples collected as soon as possible after symptom onset for IgM testing. A positive IgM test result indicates current/very recent infection or reinfection. As with any lab test, there can be false positive test results. If the suspected case has received one or more doses of MMR, the IgM response may be missing, delayed, or transient. If the acute IgM is negative, a second serum specimen should be collected. This second specimen should be tested for IgM as a delayed IgM response has been reported to have occurred in mumps cases during the recent UK outbreak, and CDC has observed a similar phenomenon during the 2006 outbreak.
- **IgG:** IgG alone is not diagnostic unless you obtain both an acute (can be done as soon after onset as the patient is seen, but ideally four to five days after onset of symptoms) and convalescent (from two to three weeks after onset) blood specimen for serologic tests to determine if a four-fold rise in IgG antibody titer has occurred (e.g., from 1:40 to 1:320). A four-fold increase in IgG titer as measured in plaque-reduction neutralization assays or similar quantitative assays, or a seroconversion from negative to positive in EIA assays from acute to convalescent is considered a positive diagnostic result for mumps.
In vaccinated persons, the existing IgG will begin to rise soon after exposure and infection. At the time of onset of symptoms and collection of the acute serum, the IgG may already be quite elevated, which would obviate the 4-fold rise in titer expected when comparing acute and convalescent samples.

If the suspected case has a positive IgG and negative IgM result, can mumps infection be ruled out?

In an outbreak setting, no. Previously vaccinated persons who are exposed to mumps will generally have existing, detectable serum IgG.

Will persons infected with mumps who are symptomatic and have a history of one or two doses of MMR have an IgM response?

The IgM response to mumps infection in vaccinated persons is highly variable and may be absent. In unvaccinated cases, IgM is present by day 5 post onset of symptoms and peaks at about 1 week; IgM can be present for at least 6 weeks.

Is it possible to demonstrate a 4-fold rise in titer between paired serum samples (acute and convalescent) among cases of mumps with a history of 1 or 2 doses of MMR?

It may not be possible. In vaccinated persons, the existing IgG will begin to rise soon after exposure and infection. At the time of onset of symptoms and collection of the acute serum, the IgG may already be quite elevated, and obviate the 4-fold rise observed in convalescent serum specimen.

A sample tests negative for mumps RNA by RT-PCR or negative for mumps virus by isolation. Do these results rule out mumps infection?

No. These samples could be negative because the amount of virus shed at the time of sample collection was very low. Inadequate specimen collection, processing, shipping or storage can also significantly reduce the likelihood of detecting mumps virus or mumps RNA.

Among symptomatic persons who have received 1 or more doses of MMR, the virus may be cleared rapidly. The results to date do not indicate that RT-PCR for mumps among vaccinated persons has provided a diagnostic tool that is superior to IgM testing. However, samples collected when the patient first presents with symptoms have the best chance of having a positive result by RT-PCR.

EXPOSURE AND RESPONSE

How do you protect patients at a doctor's office?

Basic infection control measures apply. They include:

- Screen individuals for mumps symptoms when calling-in for an appointment. Plan to separate ill patients in the waiting room or have a separate area designated. Do not allow them to sit in the waiting area for prolonged periods of time and keep them at least three feet from other patients. Request that they wear a procedure or surgical mask. Have disposable tissues readily available and have receptacles available for disposable.

- When assessing a patient for possible mumps, staff should follow Standard and Droplet Precautions.
- Wear appropriate personal protective equipment (PPE) while performing exams.
- This is the ideal time to determine immune status of personnel, documentation of two MMRs, a positive mumps IgG or history of physician diagnosed mumps, or birth before 1957. If vaccination status is not adequate, vaccinate with MMR unless contraindicated.
- Any staff member with signs and symptoms of mumps should be sent home and be off work for five days.

Should actions be taken after a mumps case visits a doctor's office?

If an office assessment has not already been done, determine immunity of the office and medical personnel. This includes documentation of two doses of MMR, a positive mumps IgG, a history of physician diagnosed mumps, or birth before 1957. Administer MMR as needed. Susceptible personnel who have been exposed should be kept from direct patient contact from the 12th day after the first exposure through the 25th day after the last exposure.

SCHOOL SETTINGS

What are the strategies for controlling mumps outbreaks in schools?

For all exposures consider the entire group that could have been exposed. That could be the whole school, whole work setting, etc. It is an opportunity to vaccinate susceptibles rather than individual persons. In the school setting all children K-12 should have documented evidence of receipt of two doses of MMR vaccine with few students on medical or religious exemptions. Do not forget to consider the staff as well.

What is the guidance for staff in a school?

Children K-12 should have documented evidence of receipt of two doses of MMR vaccine . Teachers and all staff should have their immune status verified (vaccination, serologic evidence of immunity, a history of physician diagnosed mumps, or birth before 1957). All staff should be educated on hygiene, prevention and signs and symptoms of disease

If my patient receives a second dose of MMR before he turns 4 as part of outbreak control, will he need a third dose to comply with NJ Immunization Requirements?

Due to the large outbreak of mumps that NJ is currently experiencing, we have recommended that physicians consider administering the second dose of MMR vaccine to children aged 13 months to 4 years who have received one dose instead of waiting to administer at 4 – 6 years of age, ensuring that the second shot is given a minimum of four weeks after the first. Receipt of 2 valid MMR vaccines administered in accordance with ACIP recommendations will meet the minimum requirements for attendance in kindergarten as outlined in 8:57 - 4.

NJ requires that students receive 1 dose of Rubella, 1 dose of Mumps, and 2 doses of Measles. The requirement for Measles is stated in the Minimum Immunization Requirements Table For School Attendance In New Jersey available at <http://nj.gov/health/forms/imm-7.doc> as:

"Any child over 15 months of age entering child care, pre-school, or pre-Kindergarten needs a minimum of 1 dose of measles vaccine. Any child entering Kindergarten needs 2 doses. Intervals between first and second measles-containing vaccine doses cannot be less than 1 month. Laboratory evidence of immunity is acceptable."

Therefore, as we are requesting exposed students to receive the second dose prior to 4 years of age in order to control/prevent the spread of the mumps outbreak, they will be in compliance and will not need a third dose of MMR for school attendance.

REPORTING

Mumps is a disease reportable within 24 hours as per N.J.A.C. 8:57, which can be accessed at <http://nj.gov/health/cd/izdphome.htm> Please report all suspected or confirmed cases to your local health department within 24 hours. A directory of local health departments can be found at:

<http://nj.gov/health/lh/directory/lhdselectcounty.shtml>

If unable to reach your local health department, notify the NJDHSS Vaccine Preventable Disease Program (VPDP) at regular business hours at 609-826-4860. If after-hours or on the weekend, call NJDHSS at 609-392-2020. If mumps is suspected, the VPDP can offer guidance on the appropriate

clinical specimens to obtain and facilitate transport of specimens to the Public Health and Environmental Laboratories (PHEL), as appropriate.

FOR MORE INFORMATION

Where can I get more information on mumps?

- Your local health department
- NJ Department of Health and Senior Services Vaccine Preventable Disease Program 609-826-4861
- Centers for Disease Control & Prevention www.cdc.gov

This information is intended for educational purposes only and is not intended to replace consultation with a health care professional.

For additional information and materials on proper handwashing techniques, please visit the New Jersey Department of Health and Senior Services (NJDHSS) Communicable Disease Service's Link:
<http://nj.gov/health/cd/handwashing.shtml>