


Strategies for the Control and Investigation of Mumps Outbreaks

Mumps outbreak investigation and control generally consists of several steps, some of which may occur in parallel. Each of these steps is listed below with specific guidance.


Steps of an Outbreak Investigation

 Investigate and confirm suspected mumps


 Raise provider awareness

 Identify groups of people who might have close contact with a mumps patient

 Raise public awareness

 Investigate the setting to determine if a group is at increased risk for acquiring mumps

 Reduce testing to conserve public health resources

 Recommend a third dose of MMR vaccine for groups at increased risk

 There are still cases occurring after the steps above. Now what?

 Consider exclusion of unvaccinated people in the group at increased risk from the setting

 Setting-specific guidance and resources

This document was created to consolidate various mumps outbreak guidance found in different CDC documents for use by public health officials and other partners involved in mumps outbreak response.

This document was developed by combining and updating previous outbreak guidance provided in the following materials:

- The Case Investigation, Outbreak Investigation, Outbreak Control, Healthcare Settings sections in *Chapter 9: Mumps in the CDC Manual for the Surveillance of Vaccine-Preventable Diseases (VPD)*
- CDC Guidance for Public Health Authorities on Use of a Third Dose of MMR Vaccine during Mumps Outbreaks
- Guidance for Optimizing Mumps Testing

These sections of the VPD Surveillance manual now either link to this guidance or have been removed. The guidance webpages have been retired.

Mumps outbreaks are a complex public health challenge and the response to outbreaks can be resource intensive. Mumps cases have occurred in nearly every US state each year since 2016, with outbreaks occurring across many different settings and ranging from 3 to >4,000 cases per outbreak. During many of these outbreaks, most cases have occurred in fully vaccinated persons, limiting the impact of standard outbreak control measures for vaccine-preventable diseases. Effective and feasible control measures might also differ by setting. The present document provides general guidance and tools for public health officials to apply in responding to outbreaks in their jurisdiction.

In 2020, control measures implemented across the US to combat the spread of SARS-CoV-2 (the virus that causes COVID-19) likely contributed to a decrease in mumps outbreaks. However, endemic transmission continued to occur nationwide as 142 mumps cases were reported in 32 states from April to December 2020*.

A mumps outbreak is defined as 3 or more cases linked by time and place; however, public health officials may implement mumps outbreak control measures before receiving laboratory confirmation of the initial cases or before 3 cases have been reported, especially in settings with [high likelihood for transmission](#).

**Case count is preliminary and subject to change.*

Investigating and confirming suspected mumps

Investigate the suspected mumps patient

All patients with suspected mumps should be investigated. Since 2006, mumps has been reported in people from all age groups, with a majority of cases occurring among people who are fully vaccinated. Mumps should be suspected in patients with parotitis or other salivary gland swelling regardless of their age, vaccination status, and travel history. Mumps complications may occur in the absence of parotitis; mumps should also be suspected in patients with mumps complications who do not have parotitis, especially during an ongoing outbreak in the area.

Guidance on mumps reporting, notification, and surveillance during a case investigation can be found in the [Mumps Chapter in the CDC Manual for the Surveillance of Vaccine-Preventable Diseases](#). The chapter includes a list of [key variables that should be collected during a case investigation](#).

Confirm suspected mumps

Clinical diagnosis of mumps may be unreliable, as non-epidemic parotitis may be due to other infectious and non-infectious causes. Cases of suspected mumps should be laboratory confirmed; however, negative laboratory results among vaccinated persons **do not necessarily rule out the diagnosis of mumps**, particularly if there is an outbreak of parotitis.

For sporadic cases that have negative laboratory results for mumps, consider testing for other etiologies which can also cause parotitis, including influenza virus (influenza A virus subtype H3N2), parainfluenza virus types 1–3, Epstein-Barr virus, human herpesviruses 6A and 6B, herpes simplex viruses 1 and 2, coxsackievirus A, adenovirus, parvovirus B19, echovirus, lymphocytic choriomeningitis virus, and HIV. Parotitis can also develop in patients with sarcoidosis, Sjögren's syndrome, Mikulicz's syndrome, Parinaud's syndrome, uremia, diabetes mellitus, laundry starch ingestion, malnutrition, cirrhosis, and some drug treatments. Unilateral parotitis can be caused by ductal obstruction, cysts, and tumors.

A summary of mumps testing guidance is presented below; full guidance on mumps testing can be found in the [Laboratory Testing Chapter](#) in the CDC Manual for the Surveillance of Vaccine-Preventable Diseases and on the [CDC Mumps Laboratory Testing website](#).

Mumps cases are confirmed using reverse transcription polymerase chain reaction (RT-PCR) or viral culture, usually in buccal/oral swab specimens. RT-PCR is preferred over viral culture, as viral culture may take more than a week to produce results and delay public health efforts. Testing of serum for immunoglobulin M (IgM) can be used to aid in diagnosis and to [classify probable cases](#), but is not confirmatory.

Appropriate timing and collection technique of specimens is important to ensure accurate results.

- The parotid gland should be massaged for 30 seconds prior to buccal swab collection. For instructions on how to appropriately collect a buccal swab for mumps testing, see the [video here](#).
- If it has been ≤ 3 days since parotitis onset, collect a buccal swab specimen for RT-PCR.
- If it has been > 3 days since parotitis onset, collect a buccal swab specimen for RT-PCR and a serum specimen for IgM detection.
- If the patient has orchitis/oophoritis, mastitis, pancreatitis, hearing loss, meningitis or encephalitis and does not have parotitis, collect a buccal swab specimen for RT-PCR, a urine specimen for RT-PCR, and a serum specimen for IgM detection regardless of the days since symptom onset.

During confirmed outbreaks, public health officials might choose to diagnosis patients clinically and limit mumps testing to preserve public health resources; see the section below, [Reduce testing during large outbreaks to conserve public health resources](#)

Isolate the patient

Suspected mumps patients should self-isolate for 5 days after onset of parotitis or other salivary gland swelling, even while lab results are pending or if their lab result is negative (in the absence of a more likely diagnosis or positive lab result for other etiology). In lab-confirmed mumps patients without parotitis, patients should self-isolate for 5 days after onset of their first symptom (e.g., onset of non-specific respiratory symptoms, orchitis).

Identify the source of the infection and conduct case finding

The patient should be asked if they have had contact with anyone with mumps or mumps-like symptoms, such as jaw pain or puffy cheeks, in the past 12 to 25 days (the mumps incubation period). Identifying the source of infection can assist public health officials in understanding where transmission is occurring in their jurisdiction (e.g., household, school, church) to implement mumps prevention and outbreak control measures.

If the patient resides in a congregate setting such as a correctional or detention facility or attends an institution of higher education, notifying and discussing mumps symptoms with health services at the facility or institution may also reveal additional cases not previously diagnosed as mumps.

Public health officials can also search electronic health records or electronic lab records from hospitals, clinics, institutional health services, or commercial laboratories to find patients who may have had mumps but were not reported. Mumps might be diagnosed or coded as other causes, including general salivary gland swelling (coded as "sialadenitis"), facial swelling (sometimes coded as "localized swelling, mass and lump, head"), jaw or neck pain, dental issues, or orchitis not coded as mumps orchitis.

Mumps is the only known cause of epidemic parotitis. Multiple cases of parotitis in the same local jurisdiction, setting, or clinic should be strongly suspected as a mumps outbreak. An increase in influenza activity in an area could result in multiple sporadic cases of parotitis in influenza patients, but usually these patients are not epidemiologically linked.

Identify known close contacts and groups of people who might have close contact with a mumps patient

During the case investigation, public health officials should identify 1) the people with whom a patient had close contact during their infectious period (known close contacts) and 2) groups of people who have or likely have close contact with a mumps patient.

Close contact is defined as

- a. Having direct contact with a mumps patient's infectious respiratory secretions by droplet transmission (e.g., kissing, sharing saliva-contaminated objects like water bottles, or being coughed or sneezed on). Droplets generally travel ≤ 3 feet when an infected person talks, coughs, or sneezes.

or

- b. Being in close proximity for a prolonged period of time with a person infected with mumps during their infectious period (2 days prior to 5 days after onset of parotitis or other salivary gland swelling)

Known close contacts

Known close contacts (i.e., family members, partners, or roommates) should be assessed for prior [evidence of immunity](#), and those without evidence of immunity should be [brought up to date on MMR vaccination](#). However, regardless of whether a close contact has prior evidence of immunity or receives a dose of MMR vaccine, all contacts should be advised that they may still develop mumps and should monitor for signs and symptoms for the next 25 days, avoid large gatherings or intense close contact events if possible (mumps can spread before symptom onset), and self-isolate for 5 days if they develop any symptoms.

Mumps can occur in a person who is fully vaccinated, however vaccinated persons are at much lower risk for mumps and mumps complications. Mumps reinfection in patients who previously had natural infection can also occur. Close contacts of mumps patient(s) who do not have prior evidence of immunity should not be tested for laboratory evidence of

immunity since a positive immunoglobulin G (IgG) titer may indicate acute infection and does not indicate whether a person has protection against mumps disease.

Contacts who receive a dose of MMR vaccine should be advised that MMR vaccine has not been shown to be effective at preventing disease in people already exposed and infected with mumps virus (i.e., post-exposure mumps vaccination is not recommended). If a contact receives MMR vaccine after exposure, they should be informed that they may still develop disease but if they do not develop disease, the dose can help protect them against future exposures. If the patient is part of a known outbreak or the close contact is part of a [group determined by public health officials to be at increased risk because of an outbreak](#), the contact(s) should receive a dose of MMR (i.e., additional or third dose of MMR vaccine), regardless of prior evidence of immunity.

Known close contacts who are not part of a close contact setting or congregate living setting do not need to quarantine in their home following exposure to a mumps patient. In close contact or congregate living settings, such as university dorms or correctional/detention facilities, public health officials might recommend that close contacts be cohorted or housed separately for 25 days since last exposure.

Mumps is endemic in the United States and prevalent in many other countries. Domestic or international transportation (flight, bus, etc.) contact tracing to identify and notify people who may have been exposed to mumps patients who traveled while infectious is not conducted for mumps. Country notification for patients who were infectious while in other countries and then traveled to the United States is also not conducted for mumps.

Groups of people who are likely to have close contact with a mumps patient

Public health officials should focus efforts to identify groups of people who are likely to have close contact with a mumps patient, in addition to a mumps patient's known close contacts. Public health officials must first identify these groups to then determine which groups may be at increased risk for mumps and initiate mumps control measures, including a potential recommendation for a third MMR dose (see next section). Public health officials may choose to implement these control measures before receiving laboratory confirmation of the initial cases or before 3 cases have been reported, especially in settings with a [high likelihood of transmission](#).

Examples of groups with likely close contact include:

- students from the same study group, social group, theater or choir group, or fraternity or sorority as a mumps patient
- coworkers on the same shift or who socialize after work with a mumps patient
- athletes who practice together or share sports facilities or equipment with a mumps patient

Administering a third dose of MMR vaccine to groups of people who are likely to have close contact and are at increased risk for mumps (see next section), in addition to those with known close contact, will maximize the number of people who would benefit from a third dose (i.e., persons not already infected).

Investigate the setting to determine if a group is at increased risk for acquiring mumps

Assess Transmission in the Outbreak Setting to Determine Increased Risk

After identifying groups of people who have or likely have close contact with a mumps patient, public health officials should then investigate the setting where exposures are occurring. A group's setting could be at a location such as a church or school, during an activity such as sports practice, or at an event such as a party.

Two main questions about a group's setting can guide public health officials when determining if a group is at increased risk:

1. Is there evidence that transmission occurred or has continued to occur within the group's setting (i.e., did mumps patient(s) acquire mumps from close contact exposures within a setting as opposed to outside the setting)?

2. Is there likely to be intense or frequent transmission in the group's setting (i.e., are behaviors among persons in the group likely to result in continued or wide-spread transmission)?

Public health officials can use their answers to these questions in a decision matrix to determine if the group is at increased risk for acquiring mumps (Table 1) and should receive a third MMR dose, as stated in [the ACIP recommendation](#). Criteria for classifying evidence of transmission and likelihood of transmission to use in the matrix are detailed in the next sections. Note, even if the threshold of 3 cases to meet the definition of an outbreak has not yet been met, group(s) in settings with no evidence of transmission but high likelihood for transmission might still be considered at increased risk and recommended to receive a dose.

Table 1. Decision matrix to assist public health officials when determining if a group of people is at increased risk for acquiring mumps during an outbreak

Evidence of transmission in the setting	Likelihood of transmission in the setting		
	Low	Moderate	High
<u>No</u> evidence of transmission	Not at increased risk	Not at increased risk	Might be at increased risk
Evidence that transmission <u>occurred</u>	Not at increased risk	Might be at increased risk	At increased risk
Evidence of <u>sustained or extensive</u> transmission	Might be at increased risk	At increased risk	At increased risk

How to determine if there is evidence of transmission in the setting

Public health officials can determine the evidence of transmission for mumps in a setting by looking at the number of incubation periods (average 16 to 18 days) since the first patient's onset of parotitis (or other salivary gland swelling), or by looking at epidemiological links among cases. Evidence of transmission is classified as follows (Table 2):

Table 2. Classification of evidence of transmission in a setting based on incubation period(s) since first case onset or epidemiological links among cases during a mumps outbreak

Evidence of transmission	Incubation period(s) since parotitis onset of first case	OR	Epidemiological link
<u>No</u> evidence of transmission	Case onsets <1 incubation period	OR	Case(s) likely exposed outside the setting (<i>e.g., linked to an external event or other outbreak, associated with travel</i>)
Evidence that transmission <u>occurred</u>	Case onsets 1 to <2 incubation periods	OR	Case(s) likely exposed within the setting and close contact with a primary case(s) was reported (<i>e.g., socialized or attended the same party with a patient</i>)
Evidence of <u>sustained or extensive</u> transmission	Case onsets ≥2 incubation periods	OR	Case(s) likely exposed within the setting, close contact exposures are difficult to identify, and there is an increasing number of cases (<i>e.g., cannot be epidemiologically linked to a known case or are linked to multiple cases</i>)

How to determine if there is likelihood of transmission in the setting

The likelihood of transmission in the setting depends on close contact behaviors among people in a group and increases with

- **Intensity** of close contact exposures (e.g., physical contact, such as attendance at a crowded party, or during dancing, contact sports, kissing or sexual activity; sharing of gym equipment or drinks)
- **Frequency** of close contact exposures (e.g., prolonged contact such as living in confined or shared spaces; repeated contact such as meeting regularly or sharing daily habits)

Public health officials will have to assess these behaviors for their likelihood of transmission for each group, as they can vary widely across settings and between outbreaks. In Table 3, we provide examples of settings considered to have low, moderate, and high likelihood of transmission.

Table 3. Examples of settings with low, moderate, and high likelihood of transmission during a mumps outbreak

Likelihood of transmission in the setting	Community	University or college campus	School (K–12)	Work place (office building)
Low	Community festival or fair with infrequent social interaction* among attendees	Lecture halls, dorms with infrequent social interaction*	Classrooms without cases	Building floor with shared break room
Moderate	Church group; hobbyist group with frequent meetings; choir	Social group, house/dorm with moderate social interaction*; non-sport extracurricular groups	Classrooms with cases; afterschool activities other than sports	Project group that meets daily
High	Large close-knit community, household, or social group; gym with regular close contact among members; crowded venues such as clubs or bars	House/dorm with intense social interaction*; fraternities/sororities; sports teams	Gym class or other class involving close contact activities; adolescent friend group; sports teams	Group of employees who regularly socialize

*Social interaction includes attending parties or other social gatherings together, sharing drinks, dancing, or playing sports.

Recommend a third dose of MMR vaccine for groups at increased risk

During its October 2017 meeting, the [Advisory Committee on Immunization Practices \(ACIP\)](#) recommended a [third dose of a MMR vaccine](#)** for groups of people who public health authorities determine are at increased risk for acquiring mumps because of an outbreak. Everyone who is determined to be part of the group at increased risk for getting mumps should receive a dose of MMR vaccine, regardless if they have documentation of age-appropriate vaccination or other form of presumptive evidence of immunity.

Persons recommended to receive a dose should not be tested for laboratory evidence of immunity prior to receiving a dose since a positive IgG titer may indicate acute infection and does not indicate protection against mumps disease. No additional dose is recommended for people who had already received three or more doses before the outbreak.

**The third dose may be administered as measles, mumps, rubella (MMR) vaccine for persons ≥ 12 months of age, or measles, mumps, rubella, and varicella (MMRV) vaccine for children aged 1–12 years. This document references the use of MMR vaccine as the third dose, as this would be the most likely mumps virus-containing vaccine administered during an outbreak. Additionally, previous doses of MMRV vaccine should be considered when assessing number of mumps vaccine doses received prior to an outbreak.

Additional factors to consider beyond evaluating transmission in the setting

The following factors are outside the criteria defined in the tables above but also may guide public health officials when determining if a group is at increased risk and should receive a third dose of MMR vaccine during an outbreak. Public health officials may be more likely to recommend a third MMR dose for

- A small, defined target group
- A large population with intense close contact
- When the case count is rapidly increasing, i.e., a steep upslope in the epi-curve
- When the group at increased risk for acquiring mumps includes persons who might potentially transmit to a susceptible population, e.g., students who work or volunteer in hospitals or child care centers
- The setting is known to be high risk for transmission based on previously reported outbreaks, e.g., fraternities, sports teams, or close-knit communities

Public health officials may be less likely to recommend a third MMR dose for

- A group that has few mumps cases that are dispersed among a large population
- A setting where close contact exposures are unclear or unlikely to occur again
- When the case count remains low over multiple incubation periods
- When the number of cases is declining

Notify healthcare providers and institutions of the third-dose recommendation

Public health officials should work with healthcare providers and institutions to notify people that they are at increased risk and should receive a dose of MMR vaccine. Important messages to communicate include

- You should try to get MMR vaccine through routine channels, like from your healthcare provider. (Or if the health department opts to provide vaccine, through designated vaccine clinics).
- MMR vaccine is not 100% effective, so there is a chance you could still get mumps even if you get vaccinated.
- MMR vaccine will not prevent you from getting mumps if you are already infected with the virus. It usually takes 16 to 18 days for mumps symptoms to show up after you are infected. So, if you were exposed, it is possible that you are already infected but do not yet have symptoms.
- The most common mumps symptoms include fever, headache, muscle aches, tiredness, loss of appetite, and puffy cheeks caused by swollen/tender salivary glands under the ears on one or both sides (parotitis).
- If you have mumps, you should avoid contact with other people until at least 5 days after you start to have puffy cheeks caused by parotitis or swollen salivary glands.

Additional guidance on provider and public communication and resources is provided in the sections below [Raise provider awareness](#) and [Raise public awareness](#).

Consider exclusion of unvaccinated people in the group at increased risk from the setting

Public health officials may consider recommending exclusion from the outbreak setting (e.g. school, dorm, work) for 25 days since last exposure of persons who

- Are part of the [group determined to be at increased risk](#)
- Are unvaccinated
- Do not have other [prior evidence of mumps immunity](#)

In schools and universities, this includes unvaccinated students without other prior evidence of immunity who have exemptions for medical, religious, or other reasons. Local/state public health officials should consider whether to recommend exclusions based on the local epidemiology, feasibility, and potential benefits and harms of exclusion.

recommend exclusions based on the local epidemiology, feasibility, and potential benefits and harms of exclusion policies in the local setting.

If exclusions are implemented, people who have a history of 1 dose of MMR vaccine should be allowed to remain in the outbreak setting and are recommended to receive their second vaccine dose. People who have a history of 2 doses of MMR and are recommended to receive a third dose may remain in the outbreak setting even if they do not accept the third MMR dose. Excluded people can be readmitted immediately after they are vaccinated. Once exposures have occurred in the setting, serum samples should not be collected to test for serologic evidence of presumptive immunity (presence of IgG antibodies), since a positive IgG titer may indicate recent exposure and infection with mumps virus.

Guidelines and recommendations for management of exposed persons without presumptive evidence of immunity to mumps during outbreaks in healthcare settings are presented in the section on [Healthcare settings](#) below.

Considerations for recommending exclusions of unvaccinated people

For vaccine-preventable diseases, the potential benefits of exclusions during outbreaks include limiting disease transmission, providing added personal protection against disease, and increasing vaccination coverage. However, evidence on the potential benefit of exclusions specifically during mumps outbreaks is limited and the benefits may not outweigh the challenges caused by prolonged exclusion periods.

For mumps outbreaks, there is a theoretical benefit from exclusions: that schools or other settings will limit transmission by reducing the number of known susceptible people in the outbreak setting. Exclusion of persons without presumptive evidence of immunity may also provide individual personal protection against mumps and mumps complications by reducing risk of exposure. Complications are known to be much lower in vaccinated adults than in unvaccinated adults with mumps. Studies have not assessed risk for complications between vaccinated and unvaccinated children with mumps, but mumps complications generally are very low ($\leq 1\%$) in this age group compared with adults. As mumps can still spread quicker among unvaccinated people than vaccinated people, exclusions may be more beneficial in settings with low vaccination coverage compared with settings with high vaccination coverage (e.g. $>90\%$).

Experience with outbreak control of other vaccine-preventable diseases has shown that school exclusions help to improve vaccination rates. This helps protect the community against future mumps outbreaks, as well as outbreaks of measles and rubella.

Unlike most other vaccine-preventable diseases, mumps exclusions in schools and other settings may last for extended periods of time, sometimes entire school semesters, as mumps transmission might continue among vaccinated persons. Consequently, this can lead to students, parents, and staff missing long periods of time from school or work. Health departments and universities have expressed that school exclusions are the most challenging outbreak control measure to implement during mumps outbreaks.

Raise provider awareness during outbreaks

Raising awareness among providers that a mumps outbreak is occurring in their area is key to early detection and reporting of new cases and rapid public health intervention. Since there has been relatively low incidence of mumps in the US since the 1970s, most clinicians today have never attended a mumps patient and may not be aware of changes to mumps epidemiology, how to order a mumps laboratory test, or potential third MMR dose recommendations during outbreaks.

Despite the fact that since 2006, the majority of US mumps patients have been fully vaccinated, a 2019 national survey showed that 41% to 52% of pediatricians would rarely or never test for mumps in a fully vaccinated patient with parotitis, even if there was an outbreak in the area. The study also found that only 24% would often or always order a RT-PCR test for a suspect mumps case and only 36% would often or always report a suspect case to the health department.

There is a key difference in the 2017 ACIP recommendation for a third dose of MMR during mumps outbreaks compared to previous vaccination recommendations: in the third dose recommendation, public health officials must investigate and determine the groups at increased risk for mumps and make third-dose vaccination recommendations during outbreaks. Public health officials therefore need to communicate to providers which groups are recommended to receive a third dose, as these recommendations will not be available in vaccination resources typically used by providers (e.g., the Pink Book, UpToDate.com). [See also the Notify healthcare providers and institutions of the third-dose recommendation above.](#)

Communicating to providers about appropriate testing can also help reduce the number of specimens unnecessarily or improperly collected and tested. Communication with providers regarding [appropriate testing procedures](#), including information on specimen type, timing of specimen collection, and specimen collection techniques is critical to ensure best practices before and during an outbreak. Public health officials can use the [Provider Job-Aid](#) as a tool for communicating best testing practices to providers. The Job-Aid includes an algorithm to help providers determine if testing is necessary and which specimens to collect based on symptoms. This Job-Aid is a template and can be modified by each jurisdiction based on resources, outbreak epidemiology, shipping instructions, and other local factors.

When communicating to providers, such as through the Health Alert Network (HAN), public health officials should include the following information, if available or applicable:

- Description of the mumps cases or outbreak (e.g., the number of cases, case demographics, onset in first and last case, source of transmission or outbreak setting)
- Description of mumps symptoms and complications
- Isolation guidance (5 days post-parotitis onset for standard/droplet precautions for inpatients, 5 days post-parotitis onset for self-isolation for outpatients)
- Reminder that mumps occurs in fully vaccinated people, and mumps should be suspected in all patients with parotitis or mumps complication(s), regardless of age, vaccination status, or travel history
- Testing guidance that includes the following information:
 - Suspect cases should be tested by buccal swab for RT-PCR as soon after parotitis onset as possible.
 - IgM can aid in diagnosis but is not confirmatory. The IgM response can be absent, delayed or short-lived in vaccinated patients.
 - A negative laboratory test does not rule out mumps.
 - A list of other pathogens that cause parotitis for providers to test for to potentially rule out mumps in sporadic parotitis cases.
 - Information on where they can send the specimen for testing; including guidance on [optimizing mumps testing](#) if applicable.
- MMR vaccination recommendations that includes the following:
 - Description of the group(s) of people at increased risk who are recommended to receive a third (or additional) dose; information on where people can get vaccinated, including date(s) and time(s) of public health clinics, if applicable.
 - Close contacts of mumps patients may receive a dose to protect against future exposures in the event they were not infected from previous exposures; however, MMR vaccine has not been shown to be effective at preventing disease in people already exposed and infected with mumps virus (i.e., post-exposure mumps vaccination is not recommended). Close contacts who receive a dose should be advised to continue to be vigilant for symptoms (for at least 25 days after the last exposure) and self-isolate and contact their provider if they become ill.
- How to report cases to the health department
- Links to additional information:
 - [Provider job-aid](#) (or as an attachment to the message)
 - Link to [video](#) on how to collect a buccal swab
 - Health department website
 - [CDC provider mumps page](#)

Raise public awareness during outbreaks

Communicating to the public about mumps outbreaks occurring among their close contacts, institution, or setting— or for larger outbreaks, their community—is essential to mumps prevention and outbreak control. As mumps can be spread 2 days prior to the onset of the telltale puffy-cheeks (parotitis), the sooner patients stay home and avoid large gatherings if they are feeling ill, especially when they have the prodromal symptoms (non-specific respiratory symptoms that precede parotitis by a few days), the less likely they are to transmit to others.

Public health officials can provide vaccination recommendations to the groups at increased risk directly, or they can work with local providers or the affected institutions to provide messaging. A key message when communicating vaccination recommendations is **even though people who are vaccinated may still get mumps, they are less likely than unvaccinated**

people to get mumps and mumps complications, and therefore, vaccination is still the best way to prevent mumps and mumps complications.

Public health officials and affected institutions should encourage the groups at increased risk to avoid, postpone, or cancel large gatherings, or other close contact events, until public health officials determine the outbreak has ended (usually considered 2 incubation periods [50 days] with no new cases).

Mumps has one of the longest incubation periods of the viral vaccine-preventable diseases (usually 16 to 18 days, but up to 25 days). Health departments that have automated text-messaging or an SMS system to remotely monitor close contacts could use these systems during mumps outbreaks to help remind exposed persons to stay vigilant for symptoms and contact the health department for more information if they start to feel ill.

CDC has developed infographics that public health officials and institutions can use to communicate important information to their populations during mumps outbreaks.

For children and parents:

- [Infographic: Mumps: More than just swollen glands](#)
- [Web graphic: Mumps Can Really Ruin a Selfie](#)
- [Infographic: Protect Yourself Against Mumps](#)

For university students:

- [The American College Health Association \(ACHA\) Mumps Outbreak Toolkit](#) [↗](#) : the ACHA, with assistance from CDC, developed social media images and infographics for university students

For adults:

- [Infographic: Adults Get Mumps Too!](#) (Available in English, Spanish and Hindi)

Reduce testing during large outbreaks to conserve public health resources

Guidance on mumps laboratory testing can be found in the [Laboratory Testing Chapter in the VPD Surveillance Manual](#) and on the [CDC Mumps Laboratory Testing website](#).

Since late 2015, a substantial rise in mumps cases and outbreaks has occurred in the United States. This has resulted in an increased burden on local, state, and federal public health laboratory testing resources. Sometimes this increased burden results in a disproportionate amount of VPD laboratory resources being used for mumps testing and re-allocation of funds from other VPDs.

At the onset of a suspected mumps outbreak, patients suspected to have mumps should be tested by RT-PCR to confirm mumps and rule out other possible etiologies. However, once a mumps outbreak is confirmed, jurisdictions may consider limiting testing of patients who meet the probable mumps case definition when resources are constrained or testing volume is unusually high. The [CSTE case definition for mumps](#) defines a probable case as a clinically compatible mumps case with “epidemiologic linkage to another probable or confirmed case or linkage to a group/community defined by public health during an outbreak of mumps.”

However, in certain situations, even epidemiologically linked cases warrant testing. These include:

- Patients with complications, such as oophoritis, orchitis, aseptic meningitis, encephalitis, hearing loss, mastitis, or pancreatitis
- Patients who received ≥ 3 doses of MMR vaccine more than 28 days before symptom onset
- Patients with recurrent parotitis (test samples from both occurrences when possible)
- Patients who traveled during their incubation period (12 to 25 days prior to onset), especially those with international travel

During an outbreak, jurisdictions' communication with providers should define the specific groups or communities that are considered epidemiologically linked to the outbreak and which therefore may not require testing in a public health laboratory. Jurisdictions can use the [Provider Job-Aid](#) as a tool to communicate this information to providers.

It is important to note that laboratorians may be the first to recognize increased testing activity and unusual patterns of testing requests by specific providers (e.g., only serum being sent, no buccal swabs sent for RT-PCR). Frequent communication between epidemiologists and laboratorians during an outbreak can help create efficient testing strategies and protocols and identify needs for provider-specific education. Additionally, jurisdictions and providers should identify and address logistical and institutional barriers for sending appropriate specimens to the laboratories performing mumps RT-PCR.

Reducing the testing burden on Vaccine Preventable Disease Reference Center Laboratories

In 2013, CDC, in collaboration with the Association of Public Health Laboratories (APHL) and the Council of State and Territorial Epidemiologists (CSTE), established four Vaccine Preventable Disease Reference Centers (VPD-RCs) to provide state and local jurisdictions with enhanced surveillance testing capacity for VPDs, including mumps. The VPD-RCs provide state and local public health laboratories with surge capacity for large outbreaks, testing for jurisdictions without RT-PCR capabilities, and genotyping. Since their establishment, VPD-RCs have received and tested the majority of the mumps clinical specimens sent to the federal level.

To ensure resources are adequately maintained and appropriately distributed to support jurisdictions during mumps surge activities, to monitor mumps nationally, and to manage outbreak response across all VPDs for jurisdictions requesting assistance, CDC, in collaboration with APHL and CSTE, established a mumps testing threshold. A jurisdiction may submit up to 10 specimens per week to CDC or the VPD-RCs for RT-PCR testing. CDC will contact jurisdictions that submit more than 10 specimens per week in an effort to identify the reason for the increase in testing needs and implement appropriate surveillance and laboratory testing guidance. The threshold was determined based on historical submissions to CDC and VPD-RCs and does not change the mumps outbreak case definition (≥ 3 mumps cases linked by space and time). Since most jurisdictions submit fewer than 10 clinical specimens per week for RT-PCR testing, an increase in submissions to >10 specimens for RT-PCR testing per week may indicate increased mumps activity or an outbreak within the jurisdiction. The jurisdiction, with assistance from the CDC mumps team, will develop a tailored plan to support the jurisdiction's response needs while ensuring optimal use of VPD-RC and CDC resources.

Jurisdictions may request technical assistance from CDC or the VPD-RCs at the onset of increased activity or during a mumps outbreak to discuss strategies to reduce mumps testing burden. Please contact the mumps team at ncirddvdmrhp@cdc.gov.

Submitting representative specimens for sequencing

Sequencing is an important public health tool that can inform the molecular epidemiology of mumps outbreaks as well as support national surveillance. For information on how sequencing can inform mumps epidemiology and outbreak response, see the [Mumps Chapter in the VPD Surveillance Manual](#) and the [Mumps Laboratory Chapter in the VPD Surveillance Manual](#).

To monitor ongoing established outbreaks, a maximum of 5 specimens per week from these outbreaks should be sent to a VPD-RC or CDC for sequencing. Jurisdictions that perform mumps RT-PCR testing at their state or local public health laboratories should also send RT-PCR positive specimens to monitor new or ongoing outbreaks.

There are still cases occurring after the steps above, now what?

Mumps cases might still occur despite mumps outbreak control measures and even after a third-dose vaccination campaign. Because of the long incubation period for mumps, cases are expected to continue to occur for at least 25 days among newly vaccinated persons who may have been infected before vaccination. As with all vaccines, some individuals will not develop protective immunity after receipt of mumps vaccine.

Further, there might be low levels of transmission that occur outside of the group at increased risk, or the group at increased risk might be challenging to target if they are transient or dispersed (e.g., at weddings, bars, conferences). Cases in the community outside of the outbreak setting may occur, for example, among families of employees at an affected facility or people who frequent the same bars as students who attend a university with an outbreak. It is

important to investigate these cases to determine if the case might be part of a new group at increased risk who were not part of groups already determined to be at increased risk and recommended to receive a third dose. These cases could potentially start an outbreak in a new close contact setting in the jurisdiction.

When cases continue to occur in the group(s) at increased risk, the first step is to increase messaging and access to vaccine to increase uptake of the third dose in these groups. Public health officials may choose to expand their response if they determine additional action is necessary.

Public health officials might consider an expanded public health response when, for example,

- Case counts are increasing despite a recommendation for third dose administration to a small, defined group
- There is poor vaccine access or low vaccine uptake among the group(s) at increased risk for acquiring mumps
- The group(s) at increased risk include hard-to-reach or vulnerable populations

Additional expanded response measures could include:

- Broadening recommendations for third-dose vaccination to all persons in the larger outbreak setting (e.g., institution-wide or community-wide); however, sporadic cases in the community, if not part of a group at increased risk, may not necessarily warrant a larger community-wide third-dose recommendation
- Coordinating vaccine supply and delivery or setting up special vaccination clinics
- Escalating outreach efforts; if sporadic cases are occurring outside the groups at increased risk, expand [messaging](#) on mumps prevention to the community and on [mumps testing](#) and reporting to providers
- Promoting an organized vaccination campaign

During an expanded response, public health officials may opt to recommend a dose of MMR vaccine for all people at increased risk without verifying their vaccination history. The purpose of this would be to avoid delays caused by having to review individual records. Public health officials can tell people who received a dose during the outbreak to talk to their health care provider so the provider can assess the need for additional doses to ensure age-appropriate vaccination.

Setting-specific guidance and resources

Healthcare settings

Mumps prevention and control strategies in healthcare settings

Prevention and control strategies should be applied in all healthcare settings, including outpatient and long-term care facilities. These measures include

- Assessment of presumptive evidence of immunity (refer to next section, “Healthcare personnel: presumptive evidence of immunity” for footnotes)
- Vaccination of those without evidence of immunity
- 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
- Isolation of patients in whom mumps is suspected
- Implementation of droplet precautions, in addition to standard precautions

An effective vaccination program is the best approach to prevent healthcare-associated mumps transmission. All persons who work in health-care facilities should have presumptive evidence of immunity to mumps. This information should be documented and readily available at the work location. The 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.

Healthcare personnel: presumptive evidence of immunity

The following criteria should be followed to assess presumptive evidence of immunity among healthcare personnel.

- Written documentation of vaccination with 2 doses of live mumps or MMR vaccine administered at least 28 days apart*
- Laboratory evidence of immunity†
- Laboratory confirmation of disease
- Birth before 1957‡

Footnotes

* *The first dose of mumps-containing vaccine should be administered on or after the first birthday; the second dose should be administered no earlier than 28 days after the first dose.*

† *Mumps immunoglobulin (IgG) in the serum; equivocal results should be considered negative.*

‡ *The majority of persons born before 1957 are likely to have been infected naturally between birth and 1977, the year that mumps vaccination was recommended for routine use, and may be presumed immune, even if they have not had clinically recognizable mumps disease. For unvaccinated personnel born before 1957 who lack laboratory evidence of mumps immunity or laboratory confirmation of disease, healthcare facilities should consider vaccinating personnel with 2 doses of MMR vaccine at the appropriate interval; for unvaccinated personnel born before 1957 who lack laboratory evidence of mumps immunity or laboratory confirmation of disease, healthcare facilities should recommend 2 doses of MMR vaccine during an outbreak of mumps.*

Mumps outbreaks among vaccinated healthcare personnel are rare, and when they do occur, are usually quickly contained. In the event that an 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 staff determined by public health authorities to be part of a group at increased risk should be offered a third dose of MMR vaccine, regardless of presumptive evidence of immunity. 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 either prior natural infection or vaccination and therefore is considered evidence of mumps immunity. For healthcare personnel who do not have presumptive evidence of mumps immunity, prevaccination antibody screening before MMR vaccination is not necessary.

Management of healthcare personnel with illness due to mumps

A diagnosis of mumps should be considered in exposed healthcare personnel who develop non-specific respiratory infection symptoms during the incubation period after unprotected exposures to mumps, even in the absence of parotitis.

Healthcare personnel with mumps illness should be excluded from the healthcare setting for 5 days after the onset of parotitis.

Management of healthcare personnel who are exposed to persons with mumps

Unprotected exposures are defined as being within 3 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.

For healthcare personnel who do not have acceptable presumptive evidence of immunity

Healthcare personnel without evidence of immunity should be excluded from the 10th day after the first unprotected exposure to mumps through the 25th day after the last exposure. Previously unvaccinated healthcare personnel who receive a first dose of MMR vaccine after an exposure are considered non-immune and should be excluded from the 10th day after the first exposure to mumps through the 25th day after the last exposure. The MMR vaccine cannot be used to prevent the development of mumps after exposure.

For healthcare personnel with partial vaccination

Healthcare personnel who had been previously vaccinated for mumps, but received only 1 dose of mumps vaccine may continue working following an unprotected exposure to mumps. Such personnel should receive a second dose as soon as possible, but no sooner than 28 days after the first dose. They should be educated about symptoms of mumps, including nonspecific presentations, and should notify occupational health if they develop these symptoms.

For healthcare personnel who have presumptive evidence of immunity

Healthcare personnel with evidence of immunity do not need to be excluded from work following an unprotected exposure. However, 2 doses of MMR vaccine do not provide 100% protection from mumps. Some vaccinated personnel may remain at risk for mumps and steps should be taken to reduce the risk of infection. Healthcare personnel should be educated about symptoms of mumps, including nonspecific presentations, and should notify occupational health if they develop these symptoms.


Additional guidance can be found in the ACIP [Immunization of Health-Care Personnel](#) .

Correctional and detention facility settings

Correctional and detention facilities are considered settings with a high likelihood of transmission during a mumps outbreak. Mumps can be introduced into correctional and detention facilities by staff, visitors, or persons who are incarcerated/detained who are infected with mumps. Once introduced, infectious diseases like mumps can be challenging to control in this setting given crowded dormitories, shared lavatories, limited medical and isolation resources, daily entry and exit of staff members and visitors, continual introduction of newly incarcerated or detained persons, and transport of incarcerated or detained persons in multiperson vehicles for court-related, medical, or security reasons (2,3). Also, the ability to isolate patients and quarantine/cohort exposed people within prison facilities is often limited by the availability of few medical isolation rooms and areas in which to quarantine/cohort exposed individuals. Effective control measures require timely identification of mumps cases and exposures and implementation of an immediate response when a mumps case is identified.


Public health officials and the facility owner, operator, health services, and other contract employers should work together to develop appropriate control measures based on local epidemiology and the specific needs of each facility. Effective public health interventions require understanding of facility and custody operations, which may involve frequent transfers of detainees (between facilities and states) and multiple entities with authority for operations and inmate/detainee custody.

Resources for responding to mumps outbreak in detention and correctional facilities

- CDC's [What Health Departments Need to Know When Responding to Mumps Outbreaks in Correctional and Detention Facilities](#), which provides additional guidance on mumps outbreak control measures in facilities.
- [NACCHO webinar, FAQs, Stories from the Field on Mumps in US Detention Facilities](#) 
- [CDC's adult mumps infographic \(English, Spanish, Hindi\)](#)

College and university settings

College and university campuses are common settings for mumps outbreaks and have experienced some of the largest mumps outbreaks since 2006. Outbreaks are facilitated by groups of students participating in large events with intense or frequent close contact behaviors, like sports or social gatherings. However, many outbreaks on campuses are limited to specific group(s) of students at increased risk for mumps (e.g., sports teams, fraternities and sororities). In these outbreaks, a third dose might only be recommended to students in those groups and not to the entire college or university student population. A third dose might be recommended to all students if cases are rapidly increasing and it becomes challenging to find links or identify groups at increased risk to target [vaccination](#).

The American College Health Association (ACHA), with assistance from CDC, developed a toolkit to assist colleges and universities in providing accurate and engaging information to students regarding mumps and MMR vaccine during outbreaks. The toolkit includes social media images, infographics, and talking points for university administration. <https://www.acha.org/mumpsToolkit> 

A survey of college administrators on their experience with mumps outbreak response and use of a third dose of MMR vaccine provides [lessons learned](#) for other universities.

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