

# Mumps

## PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report
- Review background on disease, case definition, and laboratory testing ([see page 2](#))
- Contact provider ([see page 8](#))
- Interview patient(s)
  - Review disease facts ([see page 2](#))
    - Modes of transmission
    - Incubation period
    - Symptoms
  - Ask about exposure to relevant risk factors ([see page 3](#))
    - Immunization history
    - Travel
    - Contact with a known patient or symptomatic person(s)
    - Visit to or work in a healthcare setting
  - Identify symptomatic contacts
  - Determine whether patient or symptomatic contact is in sensitive situation
    - Recommend exclusions for patients or symptomatic contacts ([see page 10](#))
  - Provide education on transmission and prevention ([see page 9](#))
    - Recommend immunization
  - Address patient's questions or concerns
- Follow-up on special situations, including outbreaks or patients in sensitive situations ([see page 10](#))
- Enter additional data obtained from interview into Merlin.

# Mumps

## 1. DISEASE REPORTING

### A. Purpose of reporting and surveillance

1. To determine if there is a source of infection of public health concern and to stop transmission from such a source.
2. To assess the risk of the patient transmitting infection to others, and to prevent such transmission.
3. To identify patients and prevent further spread by recommending appropriate preventive measures, including exclusion.
4. To educate potentially exposed individuals about signs and symptoms of disease, thereby facilitating early diagnosis and reducing the risk of further transmission.
5. To identify and vaccinate susceptible individuals.

### B. Legal reporting requirements

Laboratories and physicians are required to report to the local county health department (CHD) within one working day of identification/diagnosis.

### C. County health department investigation responsibilities

1. Begin investigation within one business day of receiving report from a provider.
2. Administer appropriate measures to control further spread. **See Section 6 (page 9) for recommendations on controlling further spread.**
3. Facilitate transport of specimens to Florida Department of Health Bureau of Public Health Laboratories (BPHL) Virology Laboratory as warranted.
4. Identify contacts of the patient and potential sites of transmission during the period of communicability.
5. Enhance surveillance for at least two incubation periods (50 days) from onset of parotitis in the last patient during outbreaks.
6. Report all suspect, probable, and confirmed patients in Merlin. An extended data screen is available in Merlin to report additional clinical data. Remember to ask and enter the complete vaccination history for all patients and contacts.

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic agent

Mumps is caused by an RNA virus classified as a Rubulavirus in the Paramyxoviridae family.

### B. Description of illness

Initial symptoms are non-specific and include; myalgias, anorexia, malaise, headache, and low-grade fever and may last 3-4 days. Parotitis (inflammation and swelling of the parotid glands, the major salivary glands on either side of the face) is the most common clinical manifestation of mumps, but may only appear in 30-40% of infected persons. Parotitis may be unilateral or bilateral; other combinations of single or multiple salivary glands may be affected. Parotitis usually occurs within the first two days of symptom onset and presents as an earache or tenderness on palpation of the angle of the jaw. Symptoms usually decrease within one week and resolve within 10 days.

Diagnosis of mumps can be easily missed, as up to 20% of infections are asymptomatic, and an additional 40-50% may have only nonspecific or primarily respiratory symptoms, particularly among children less than five years of age.

Orchitis (inflammation of the testicles) is the most common complication, affecting up to 50% of infected males who have reached puberty. While painful, orchitis rarely leads to sterility. Other complications are also rare but may include encephalitis, meningitis, oophoritis (inflammation of the ovaries), mastitis (inflammation of the breasts), pancreatitis, myocarditis, arthritis, and nephritis (inflammation of the kidneys). Spontaneous abortion (miscarriage) may result if the infection occurs during pregnancy, particularly in the first trimester. Temporary or permanent deafness may occur from a mumps infection, though it is rare (~1 in 20,000). Death due to mumps is rare.

Although mumps virus is the only agent known to cause epidemic parotitis, not all instances of parotitis are caused by the mumps virus. Sporadic parotitis can also occur as a result of infection with other viral pathogens such as enteroviruses (including coxsackievirus), parvovirus B-19, adenoviruses, parainfluenza virus types 1 – 3 (PIV 1 – 3), influenza A and B, human herpesviruses 6 (HHV-6), Epstein-Barr virus (EBV), and bocavirus (HBoV) as well as infection with *Staphylococcus aureus* and other bacteria. Additionally, non-infectious causes of parotitis include drugs, tumors, immunologic diseases, and obstruction of the salivary duct. Current mumps diagnostics do not ALWAYS satisfactorily identify cases in previously vaccinated people; thus, a negative laboratory test result for mumps cannot rule out the disease. Also, testing for alternative causes of parotitis is not routinely done. Because of this, most mumps–negative patients with parotitis lasting two days or more must still be considered suspected mumps.

### C. Reservoirs

Humans are the only known reservoir of the Mumps virus.

### D. Modes of transmission

Transmission occurs through respiratory droplets and through direct contact with nasopharyngeal secretions (mouth, nose or throat of infected individual). Items used by an infected person, such as a coffee cup or soft drink can, can also be contaminated with the virus, which may spread to others if the item is shared.

### E. Incubation period

The incubation period is usually 16–18 days, but can range from 12–25 days after exposure.

### F. Period of communicability

Mumps transmission likely occurs before the salivary glands begin to swell and within the five days after swelling begins. Therefore, CDC recommends isolating mumps patients for five days after glands begin to swell. Mumps virus can be found in respiratory secretions as early as three days before onset and up to nine days after onset, however infected individuals are most infectious within the first five days.

### G. Treatment

Supportive

**H. Prophylaxis**

None indicated.

**I. Immunity**

Immunity is generally considered lifelong. Most adults born before 1957 are likely to have been infected naturally and may be considered immune even if they did not have recognized disease. Recent evidence suggests that persons previously exposed to the virus through either vaccination or disease may still become infected.

Current CDC recommendations call for the first dose of the MMR (Measles, Mumps, and Rubella) or MMRV (Measles, Mumps, Rubella, Varicella) between 12-15 months and the second dose between 4-6 years of age. The second dose may be administered before four years of age provided greater than four weeks has elapsed following an MMR or 12 weeks has elapsed following an MMRV.

In response to the multistate mumps outbreak in 2006, ACIP recommendations for prevention and control of mumps were updated. Evidence of immunity through documentation of vaccination is now defined as:

- One dose of live mumps vaccine for preschool-aged children and for adults not at high risk for exposure and infection, and
- Two doses of live mumps vaccine for school-aged children (i.e., grades K–12) and for adults at high risk for exposure and infection (i.e., health-care workers, international travelers, and students at post-high-school education institutions)

**J. Mumps in Florida**

The 2010 statewide incidence rate for mumps was 0.05 per 100,000 population. Ten patients were reported in 2010, eight of which were reported as confirmed and two as probable. One infection was acquired outside of the U.S. and one was hospitalized. Five of the patients received mumps-containing vaccine, two had no history of vaccination, and three had unknown immunization status.

The 10 reported patients represent a decrease from 18 reported in 2009. Incidence of mumps was relatively unchanged from 2000 to 2005. However, in 2006, there was a significant increase in infections in the U.S., especially in the college-age population. The peak in Florida activity occurred in 2007 and has declined since, decreasing in 2010 to 35.9% below the previous five-year average.

**3. CASE DEFINITION****A. Clinical description**

An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid and/or other salivary gland(s), lasting at least two days; acute illness characterized by a mumps-associated complication such as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis or other salivary gland swelling.

**B. Laboratory criteria for diagnosis**

**Confirmed**

- Isolation of mumps virus in cell culture from clinical specimen

OR

- Detection of mumps nucleic acid (e.g., standard or real time RT-PCR assays),

**Probable**

Positive test for serum anti-mumps IgM antibody

**C. Epidemiologic Linkage**

A case can be epidemiologically linked to a clinically compatible case or to a laboratory confirmed case or be a member of a risk group defined by public health authorities during an outbreak. To be considered a confirmed case based on epidemiologic linkage, there must be a laboratory confirmed case in the chain of transmission.

**D. Case classification**

**Confirmed:** A positive mumps 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 2 days, aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, mastitis, pancreatitis.

**Probable:** A case with 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
- In a person who is epidemiologically linked to another confirmed or probable case or to a group/community defined by public health during an outbreak of mumps.

**Suspect:**

- A case with parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis
- OR
- A case with positive laboratory tests for mumps with no mumps symptoms (with or without epidemiological-linkage to a confirmed or probable case).

**E. Comment**

Case Classification for Import Status:

*Internationally imported case:* An internationally imported case is defined as a case in which mumps results from exposure to mumps virus outside the United States as evidenced by at least some of the exposure period (12–25 days before onset of parotitis or other mumps-associated complications) occurring outside the United States and the onset of parotitis or other mumps-associated complications within 25 days of entering the United States and no known exposure to mumps in the U.S. during that time. All other cases are considered U.S.-acquired cases.

*U.S.-acquired case:* A U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 25 days before onset of parotitis or other mumps-associated complications or was known to have been exposed to mumps within the United States.

*U.S.-acquired cases* are sub-classified into four mutually exclusive groups:

- *Import-linked case*: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.
- *Imported-virus case*: A case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported mumps genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any mumps virus that occurs in an endemic chain of transmission (i.e., lasting  $\geq 12$  months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.
- *Endemic case*: A case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of mumps virus transmission continuous for  $\geq 12$  months within the United States.
- *Unknown source case*: A case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Note: Internationally imported, import-linked, and imported-virus cases are considered collectively to be import-associated cases. With previous contact with mumps virus either through vaccination (particularly with 2 doses) or natural infection, serum 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. Therefore, mumps cases should not be ruled out by negative laboratory results. Serologic tests should be interpreted with caution, as false positive and false negative results are possible with IgM tests. Currently, there is insufficient information to determine whether any mumps strains are endemic to the United States or to distinguish endemic from non-endemic strains.

## 4. LABORATORY TESTING

### A. Criteria for diagnosis

Mumps can be confirmed by isolating the virus in cell culture inoculated with buccal swab (Stenson duct exudates), oropharyngeal swab, saliva or spinal fluid specimens or detection of mumps virus nucleic acid by reverse-transcriptase polymerase chain reaction in those same specimens.

Mumps can also be identified by detection of mumps-specific immunoglobulin (Ig) M antibody in serum; or by a significant increase between acute and convalescent titers in serum mumps IgG antibody titer determined by standard quantitative or semi-quantitative serologic assay (most commonly, semi-quantitative enzyme immunoassay).

### B. Services available at BPHL

1. The Bureau of Public Health Laboratories- Jacksonville identifies mumps from buccal swabs (Stenson duct exudates), oropharyngeal swabs, and spinal fluid using

PCR methods. Specimens should immediately be placed in cold storage for transport to the laboratory. Testing for mumps requires prior consultation with the laboratory.

2. The Bureau of Laboratories- Jacksonville uses serology to identify mumps antibody in serum. Specimens should immediately be placed in cold storage for transport to the laboratory. Testing for mumps requires prior consultation with the laboratory.

### C. Testing requests

1. Submitting specimens/isolates to BPHL
  - a. A completed laboratory requisition ([http://dohiws/divisions/laboratories/Forms/DOH\\_Form\\_DH1847\\_1009.pdf](http://dohiws/divisions/laboratories/Forms/DOH_Form_DH1847_1009.pdf)) or an ELO manifest must accompany the specimen.
  - b. Electronic Laboratory Ordering (ELO) may also be used by entering request into the HMS State Laboratory System, placing bar coded label on the specimen, and writing the date collected on the vial.
2. Specimen collection
  - a. CSF or oral/buccal or oropharyngeal swabs collected on a Dacron swab in viral transport media that is properly labeled (name, date of birth, date collected) should be submitted for PCR testing.
  - b. Serum is the required specimen for serologic testing and should be properly labeled (name, date of birth, date collected).  
Note: All specimens should be immediately placed in cold storage for transport to the laboratory.
3. Packaging and shipping
  - a. Send serum for IgM and/ or IgG antibody testing to the BPHL-Jacksonville. Specimens for molecular assay and culture to either the BPHL-Jacksonville or BPHL-Tampa.
  - b. Place each specimen in a separate zip-lock plastic bag. Do not wrap the requisition around the tube or place it inside the bag with the specimen.
  - c. Package according to International Air Transport Association (IATA) regulations, labeling the outer shipping container: *UN3373, Biological Substance Category B*.
  - d. Specimens should be sent in a small Styrofoam cooler with gel-ice packs. The gel-ice packs should not be in direct contact with vials. See Flowchart available at:  
[http://www.doh.state.fl.us/lab/PDF\\_Files/Packaging\\_Flowchart\\_0422051.pdf](http://www.doh.state.fl.us/lab/PDF_Files/Packaging_Flowchart_0422051.pdf)
4. Contact the laboratory with questions:  
Jacksonville Virology: 904-791-1539 or 904-791-1540  
Tampa Virology: 813-974-5990 or 813-974-0134

### D. Interpretation of results

Mumps is diagnosed at the BPHL by detection of mumps nucleic acid by PCR assay on secretions collected from the buccal mucosa, oropharyngeal swabs or CSF or detecting mumps specific IgM antibody in serum. Testing for mumps requires prior approval from the laboratory.

The preferred sample for viral isolation is a swab from the parotid duct, or the duct of another affected salivary gland collected from an acutely infected patient .

Though prior approval for testing is required, collection of viral samples from persons suspected of having mumps is strongly recommended.

Laboratory confirmation of mumps in previously vaccinated or infected individuals is challenging and failure to detect mumps IgM in previously vaccinated person is well documented. IgG may be present and RT-PCR may have a low yield. Therefore, mumps cases should not be ruled out by negative laboratory results. If the initial IgM test result is negative, a second (convalescent) serum specimen obtained 2-3 weeks after onset of signs and symptoms may test positive. A delayed IgM response has been observed in people with confirmed mumps, especially in immunized populations. However, emphasis should be placed on obtaining a specimen 1-3 days after onset of symptoms (usually parotitis).

## 5. CASE INVESTIGATION

### A. Contact the physician or hospital

1. Confirm that a mumps infection has been diagnosed in the reported patient.
2. Obtain the following:
  - a. Date of onset
  - b. Signs and symptoms (especially parotitis)
  - c. Predisposing conditions (e.g., immunosuppression, immunization status)
  - d. Tests performed (including PCR and rule out testing for other disease that cause parotitis.)
3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.
4. Obtain as much demographic information as possible, including contact information (home, cellular, pager and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).
5. Notify the physician that you will be contacting the patient as DOH follows up on all patients of mumps to assess risks factors, to better characterize the occurrence of mumps infection in Florida, and to identify potential means for preventing further illness. It may also be appropriate at this point to determine if the physician has any concerns in regards to the health department contacting the patient.

### B. Interview the case

1. Contact the patient by telephone, home visit, or visit to the hospital. Interviews should be completed as soon as possible after being reported to optimize recall.
2. Use the extended data form in Merlin to assist in the interview.
3. Items to cover during interview include:
  - a. Provide brief background on disease, including possible modes of transmission, incubation period, symptoms, etc.
  - b. Immunization status
  - c. Exposures during exposure period (12-25 days before onset)\*:
  - d. Travel outside Florida or the United States. Determine dates of travel.
  - e. Determine if others (e.g., family, friends, coworkers, customers, patients, etc.) are known or thought to be ill with similar symptoms. If so, inquire about possible common source exposures. Obtain the name, phone number or address and clinical information of the ill person. Anyone meeting the probable definition should be reported and investigated in the same manner as a confirmed patient.

- f. Determine if the patient or any of their symptomatic household or other close contacts are associated with **sensitive situations** (i.e. an attendee or employee of a daycare/ childcare setting, or an employee in a healthcare setting with direct patient care). Determine the dates and times he/she worked to determine the risk of transmission to others. [See Section 7 for recommended exclusions for symptomatic patients or contacts in sensitive situations.](#)
  - g. Provide basic instruction to patients and potentially exposed contacts about contact precautions, quarantine recommendations, hand hygiene, immunizations, etc. [See Section 6 for recommendations on controlling further spread.](#)
- C. Merlin data entry**  
Create a case in Merlin under disease code **MUMPS-07290**.  
Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms and Extended Data screens, and attach all relevant labs. Please attach **ALL** labs received via electronic laboratory reporting (ELR) to the patient record. Remember to enter the vaccination history for all patients.

## 6. CONTROLLING FURTHER SPREAD

### A. Patient/household education on prevention recommendations

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

### B. Isolation of cases

CDC recommends isolation of infected individual for five days after onset of parotitis. The incubation period for mumps can range from 12-25 days.

### C. Management of contacts

1. Symptomatic contacts: if the probable definition is met, the contact should be reported, investigated, and managed in the same manner as a confirmed patient. [See Section 7 for recommended exclusions for symptomatic contacts in sensitive situations](#) (i.e. an attendee or employee of a daycare/ childcare setting, a food handler, or an employee in a healthcare setting with direct patient care).

### D. Immunization recommendations

A live attenuated mumps virus vaccine (Jeryl Lynn strain) was introduced in the United States in 1967 and is available in combination with rubella and measles live virus vaccines (MMR). Routine immunization with MMR is recommended during childhood; the first dose of MMR is recommended at 12–15 months of age with a second dose recommended at 4–6 years. The state of Florida requires students entering, attending, or transferring to public/non-public schools K-12 to have two doses of the MMR as documented on the Florida Certification of Immunization form (DH 680). Public/non-public Pre-K students should have age-appropriate doses as indicated. See the Florida Immunization Guide for further detail. **See Section 8 for appropriate link.** Two doses of MMR vaccine are also recommended for students attending college and other post-high school institutions, international travelers, and healthcare personnel. Although about 95% of susceptible persons develop antibodies after a single dose of vaccine, only about 80% can be considered protected. After two doses of vaccine, 90% of persons are considered protected.

Mumps vaccine is also available as a combined mumps, measles, rubella and varicella vaccine (MMRV) (CDC.: Use of Combination Measles, Mumps, Rubella, and Varicella Vaccine, May 7, 2010 / 59(RR03);1-12. Accessed July 30, 2010 at: [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5903a1.htm?s\\_cid=rr5903a1\\_e](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5903a1.htm?s_cid=rr5903a1_e))

**Contraindications** to vaccine include a severe allergic reaction (e.g., anaphylactic allergy) to neomycin, gelatin or a previous dose of MMR vaccine; pregnancy; and immunodeficiency or immunosuppression. Persons with moderate or severe acute illness should not be vaccinated until the illness has resolved. Receipt of antibody-containing blood products (e.g., immune globulin, whole blood, or packed red blood cells) may interfere with seroconversion following mumps vaccination. Vaccine should be given two weeks before, or deferred for at least three months following, administration of an antibody-containing blood product.

For more information about MMR vaccine schedules, adverse reactions and contraindications, please see the current **Pink Book** at <http://www.cdc.gov/vaccines/pubs/pinkbook/index.html>.

## 7. MANAGING SENSITIVE SITUATIONS

### A. Case or symptomatic contact attends or works at a day care facility

1. **All close contacts** with symptoms compatible with mumps should be referred to a healthcare provider for assessment and laboratory testing; the healthcare provider should be made aware of the specific reason for referral.
2. **All symptomatic close contacts** should be excluded from school, workplace and child care until they have been evaluated for possible mumps.
3. **Susceptible asymptomatic contacts** should be excluded from school, workplace, and child care from the 12th day after the first exposure through 26 days after the last exposure.

\*CDC recommends isolation of infected individual for five days after onset of parotitis.

### B. Case or symptomatic contact works at a healthcare or residential care facility

Exclude healthcare personnel (HCP) with active mumps illness and those who lack evidence of immunity and have had unprotected exposure to mumps. Unprotected exposure is defined as being within three feet of an individual with mumps without using proper personal protective equipment (surgical mask). Susceptible HCP exposed to patients with mumps should be excluded from the 12th day after first exposure through the 26th day after last exposure. Healthcare workers should report any signs or symptoms during the incubation period (12-25 days) after exposure regardless of immunization status.

Healthcare workers with mumps illness should be excluded until five days after onset of parotitis.

## 8. IMPORTANT LINKS

- A. Florida Immunization Guidelines  
[http://www.doh.state.fl.us/disease\\_ctrl/immune/schoolguide.pdf](http://www.doh.state.fl.us/disease_ctrl/immune/schoolguide.pdf).
- B. CDC Mumps Homepage  
<http://www.cdc.gov/mumps/index.html>.
- C. Florida Department of Health List of Reportable Diseases  
[http://www.doh.state.fl.us/disease\\_ctrl/epi/surv/CaseDef2011.pdf](http://www.doh.state.fl.us/disease_ctrl/epi/surv/CaseDef2011.pdf).
- D. MMWR: May 7, 2010  
[http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5903a1.htm?s\\_cid=rr5903a1\\_e#box](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5903a1.htm?s_cid=rr5903a1_e#box).
- E. Florida Department of Health: Bureau of Immunization Field Staff Contacts  
[http://www.doh.state.fl.us/Disease\\_ctrl/immune/field\\_staff/index.htm](http://www.doh.state.fl.us/Disease_ctrl/immune/field_staff/index.htm).

## 9. REFERENCES

- A. American Academy of Pediatrics. (2012). *Red Book: 2012 Report of the Committee on Infectious Diseases* (29<sup>th</sup> ed.). Grove Village, IL: American Academy of Pediatrics.