Mumps

CASE DEFINITION / CLASSIFICATION

Suspect

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

Probable

Acute parotitis or other salivary gland swelling lasting at least 2 days, or orchitis or oophoritis unexplained by another more likely diagnosis, in:

- A person with a positive test for serum anti-mumps immunoglobulin M (IgM) antibody, OR
- A person with epidemiologic linkage to another probable or confirmed case or linkage to a group/community defined by public health during an outbreak of mumps.

Confirmed

A positive mumps laboratory confirmation for mumps virus with reverse transcription polymerase chain reaction (RT-PCR) or culture in a patient with an acute illness characterized by any of the following:

- Acute parotitis or other salivary gland swelling, lasting at least 2 days
- Aseptic meningitis
- Encephalitis
- Hearing loss
- Orchitis
- Oophoritis
- Mastitis
- Pancreatitis

Comments:

- ♦ It is not known if immunity to mumps wanes. While mumps antibody levels decline over time, the correlates to immunity are not well understood and the significance of lower circulating mumps antibody is uncertain.
- ♦ A person who has previously been vaccinated against mumps or previously had mumps and who is being evaluated subsequently for the disease may not have a conventional serologic response; IgM may be undetectable (it may be altogether absent, delayed, or transient) and IgG may rise rapidly, masking documentation of a characteristic significant rise. Moreover, in such persons viral detection in RT-PCR or culture may be unsuccessful or have low yield.
- ♦ See further discussion in mumps serology notes below (in Laboratory Specimens, Procedures and Considerations section).
- ♦ Therefore, mumps cases should not necessarily be ruled out by negative laboratory results.
- ♦ Serologic tests should be interpreted with caution, as false positive and false negative results are possible with mumps IgM tests.
- ♦ False-positive mumps IgM results by immunofluorescent antibody assays have been reported
- ♦ Various other viruses can also cause parotitis (including influenza A, parainfluenza types 1 and 3, Epstein-Barr virus, Coxsackie A virus, echovirus, lymphocytic choriomeningitis virus, and HIV). There are also other non-infectious causes of parotitis.

TRANSMISSION

Person to person via airborne transmission or direct contact with infected droplet nuclei or saliva.

INCUBATION PERIOD

16 – 18 days, range 14 -25 days. See Mumps Timeline, below.

PERIOD OF COMMUNICABILITY

Most likely 3 days before to 5 days after (possibly 7 days before symptom onset to possibly 9 days after).

REPORTING/INVESTIGATION

Health care providers should **immediately** report cases and possible cases of mumps to local health department serving the residence of the case.

Local health department role/responsibilities:

- Contact case/guardian and health care provider.
- Investigate and determine if case meets clinical case definition.
- Control measures (below) are recommended for Confirmed and Probable cases (reports meeting the Suspected classification warrant additional watchfulness and community surveillance for additional possible cases).
- Assist with coordination of specimen collection and coordination if public health lab resources (MDHHS, CDC, etc.) are used.
- Report/ensure reporting of case to the Michigan Disease Surveillance System (MDSS). CDC Mumps Surveillance Worksheet may be helpful in field investigation to collect and capture data. Obtain immunization history information from provider record or MI Care Improvement Registry (MCIR - state immunization registry).
- Update the MDSS record in a timely manner with new or additional info as it becomes available. Finalize MDSS record when case investigation is complete.
- In the event of death, obtain and send copies of hospital discharge summary, death certificate, and autopsy report to MDHHS Immunization Division.

LABORATORY CONFIRMATION

Lab confirmation of mumps cases is strongly recommended and should be attempted for all potential cases meeting the clinical case definition. Laboratory confirmation for mumps is defined as one or more of the following:

- Detection of mumps nucleic acid (RNA) standard or real-time reverse transcription polymerase chain reaction (RT-PCR).
- Viral culture isolation of mumps virus from a clinical specimen (e.g. buccal mucosal swabs, throat swabs, oral fluid; urine).

In addition to the above, mumps serology testing for mumps IgM antibody is also recommended.

See additional information under LABORATORY SPECIMENS: PROCEDURES AND CONSIDERATIONS, below.

Mumps testing is available through the MDHHS laboratory but must be approved. Pre-approval arrangements must be made through the MDHHS VPD Surveillance Coordinator at 517-335-8159.

IMMUNITY/SUSCEPTIBILITY

Individuals should be considered immune to (protected against) mumps only if they meet one or more of the following conditions:

- Documentation of adequate immunization, defined as
  - 1 dose of a live mumps virus vaccine for preschool-aged children and adults not at high risk of exposure to mumps;
  - 2 doses for school-aged children (i.e., grades K--12) and for adults at high risk (i.e., health-care workers, international travelers, and students at post-high school educational institutions).

- Serologic (laboratory) evidence of immunity to mumps
  - Though there are no data that correlate levels of serum antibody with protection from disease, presence of mumps specific IgG antibodies can be considered evidence of mumps immunity.

- Laboratory confirmation of a past diagnosis of mumps

- Born before 1957

NOTE: All persons who work in a health care setting *in any capacity* should have evidence of immunity to measles, mumps, rubella, varicella, pertussis, hepatitis B, and seasonal influenza.

CONTROL MEASURES

Investigate reports of suspected, probable, and confirmed mumps cases **immediately**.

For a sporadic case meeting the Suspected classification, a minimum response consisting of increased surveillance for additional cases in the setting (e.g. school) and/or general community is recommended.

For any case(s) meeting the Probable or Confirmed classification, the following public health measures are recommended:

- Enhance surveillance in the affected setting and community.

- Exclude and isolate cases and any possible cases from group activity settings (e.g. schools, day-care centers, work places, camps) until 5 days after onset of parotitis, or until ruled-out by physician or laboratory testing. Instruct cases to avoid exposing other persons, especially persons or groups thought to be susceptible to mumps. In health care settings, use of Droplet Precautions and Standard Precautions is recommended.

- Persons exposed to the case in group-activity settings (e.g. schools, day-care centers, work place, camps) who cannot readily provide documentation of mumps immunity should be vaccinated. Those who elect not to be vaccinated should be excluded from the setting.

- Susceptible persons unwilling to be vaccinated (see following bullet points) should continue to be

excluded until 25 days after the onset of parotitis (or other compatible illness) in the last person with mumps (i.e. last identified case) in the affected setting/institution.

- Mumps vaccine should be administered to susceptible persons. Although mumps vaccination has not been shown to be effective in preventing mumps in persons already exposed (i.e., post-exposure prophylactic value of vaccine has not been demonstrated for mumps), it will prevent infection resulting from subsequent exposure(s). Susceptible persons vaccinated early in the course of an outbreak might be protected. However, cases may be expected to continue to occur among newly vaccinated persons since they may have been vaccinated after already being exposed and infected.

- Once vaccinated, susceptible persons may be re-admitted to the activity setting/institution; however, such a re-admittance policy may be modified depending upon the circumstances involved. If the dose given is the first dose of mumps-containing vaccine, a 2nd dose should be scheduled and received 28 days after the first dose.

- Provide information about mumps to persons at risk and/or the general public. A Question-&-Answer mumps information sheet in **.PDF** format is available from the Immunization Action Coalition (http://www.immunize.org/catg.d/p4211.pdf)

- Based on data showing a 2 dose schedule of mumps (MMR) vaccine is more effective than one dose for preventing mumps, during outbreaks a 2nd dose of MMR is recommended for the following groups:
  - Health care workers
  - School-aged children
  - Children aged 1 – 4 years
  - Students at post-high school educational institutions
  - Other age groups considered at high risk of exposure

LABORATORY SPECIMENS: PROCEDURES AND CONSIDERATIONS

PCR testing or culture is currently considered the appropriate method for mumps case confirmation; serologic testing for mumps IgM (or paired IgG rise) is also recommended in addition to PCR or culture. PCR/culture is important to characterize the molecular epidemiology of circulating mumps virus strains.

Specimens for both serology and virology (culture and/or PCR) testing should be collected from suspected cases. Recommendations for mumps diagnostic testing are as follows:

- **Obtain serum** within 5 days of onset to test for mumps IgM antibody. See also MUMPS SEROLOGY below for more information

- **Obtain a swab of the buccal mucosa** (inside of cheek, near the parotid duct). Use a Dacron or other synthetic swab. Place in viral transport medium. See also MUMPS VIROLOGY below for more information

- If the mumps IgM antibody titer is negative, consideration should be given to repeating the mumps IgM on a second serum specimen obtained 1 – 3 weeks after the onset of illness*.

- Acute/convalescent paired serum specimens can also be used to detect a significant rise in the level of mumps IgG antibody; for this reason it is advisable to have the lab keep the acute-phase serum specimen.§

***Note:** In previously vaccinated persons, the mumps IgM antibody response is variable and therefore may not be detectable (due to either absent, delayed, or transient mumps IgM response); various data suggest the mumps IgM may be negative in up to 50-60% of acute serum samples among patients who have been previously immunized. Therefore, the diagnosis of mumps should not necessarily be ruled out in a previously vaccinated person on the basis of a negative IgM test. In previously vaccinated persons, if the mumps IgM is negative, consideration should be given to repeating it in a later specimen collected approximately 1 - 3 weeks after onset of swelling or other initial symptoms of illness.

§Note: IgG testing for laboratory confirmation of mumps requires the demonstration of seroconversion from negative to positive, or the demonstration of a fourfold rise in the titer of antibody against mumps as measured by a quantitative assay. In previously vaccinated persons, IgG antibodies may rise very quickly, such that the acute-phase serum specimen may already contain peak or near-peak IgG antibody levels, thus masking a detectable rise when compared to the convalescent-phase serum.

MUMPS SEROLOGY

Additional MDHHS lab info available at
http://www.michigan.gov/documents/LSGMumps_Virus_Antibody_Determination_8371_7.doc

Purpose: to confirm a case of mumps.

Specimen needed: serum, 2 ml.

MDHHS lab kit: unit 8

Specimen container: plastic serum tube with skirted cap

MDHHS lab form: DCH-0583

Serum specimen collection/submission procedure:

- Collect at least 5 mL of whole blood in red-top or other tube without anticoagulant. Separate serum from blood by centrifugation and pour into PLASTIC serum tube, store at 2 - 8°C, or freeze serum if it cannot be shipped and received in lab within 3 days. Do not freeze whole blood.

- Timing of specimen collection
  - **For IgM testing**:
    - **Previously unvaccinated**: best to collect serum 3-5 days after onset, but can be up to 30 days after.
    - **Previously vaccinated**: collect 3-5 days after onset, if negative consider repeating IgM 2-3 weeks after onset.
  - **For paired IgG testing**:
    - acute-phase specimen - collect as soon after mumps illness onset as possible;
    - convalescent-phase specimen - collect 2-3 weeks (no earlier than 10 days) after collecting acute-phase specimen.

    Note: Test will be done when both specimens are received (specimens can be sent individually or acute can be held at 2 - 8°C and sent to lab with convalescent specimen). If the specimens are sent to MDHHS lab separately, be sure to indicate on the Lab Request form that this is an acute serum and that the convalescent specimen will follow.

- Label tube with patient name, date of birth, and date of specimen collection.

- Complete MDHHS Virology Test Requisition (form DCH-0583); complete all information in the Patient Information and Specimen Information sections; write in "Mumps IgM" in the "Other – Specify Test Code/Name" area.

- Be sure MDHHS Immunization Division has been notified of the case investigation; prior MDHHS approval is required.

- Ship specimens on a cold pack by overnight delivery.

- Mail specimens to:

  Michigan Department Health & Human Services
  Bureau of Laboratories
  3350 N. Martin Luther King Blvd.
  Building 44, Room 155
  Lansing, MI 48909

MUMPS VIROLOGY/MOLECULAR EPIDEMIOLOGY STUDIES

Additional MDHHS lab info available at
http://www.michigan.gov//documents/MDHHS/Mumps_PCR_LSG_180356_7.doc

Purpose:

To confirm a case and/or to determine the geographic origin and other genetic characteristics of the virus. Virus isolates and PCR results are important for molecular epidemiologic surveillance.

Specimens:

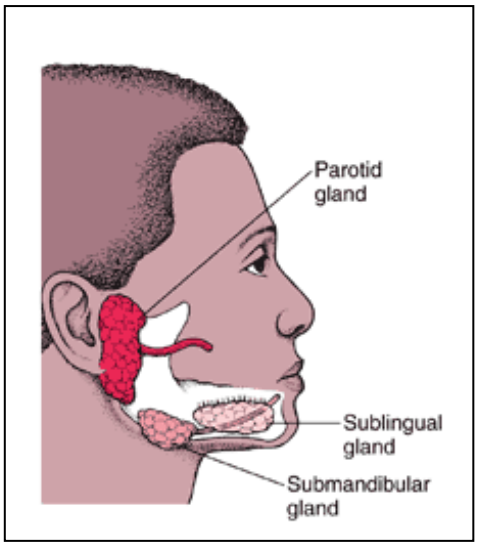
Buccal mucosal swabs are preferred. Use only Dacron-tipped swabs with an aluminum or a plastic shaft; place in vial of viral transport medium.

Viral specimen collection/submission procedure:

- Using Dacron or other synthetic tip swab, collect a buccal mucosa swab as soon as possible after onset, ideally within 3 days of onset (no later than 9 days after symptom onset)

  - Procedure: Massage parotid area of external cheek for 30 seconds prior to swabbing the buccal mucosa, i.e. the space between the inside of cheek and the upper molar teeth. The parotid duct (Stensen's duct) drains in this space near the upper rear molars.

Location the Major Salivary Glands



- Place swab in tube containing 2-3 mls of viral transport medium or other sterile isotonic solution (phosphate buffered saline or cell culture medium). Leave swab in tube (cut or break off swab stem if necessary to fit). Be sure to tighten tube cap.

- Label all specimen containers used with patient name, date of birth, and date of specimen collection.

- Complete a MDHHS Virology Test Requisition (form DCH-0583,) for each specimen submitted; complete all information in the Patient Information and Specimen Information sections. Enter "Mumps PCR 2983" in the "Other – Specify Test Code/Name" area.

- Send on cold pack via overnight courier to MDHHS lab

- Mail specimens to:

Michigan Department of Health & Human Services
Bureau of Laboratories
3350 N. Martin Luther King Blvd.
Building 44, Room 155
Lansing, MI 48909

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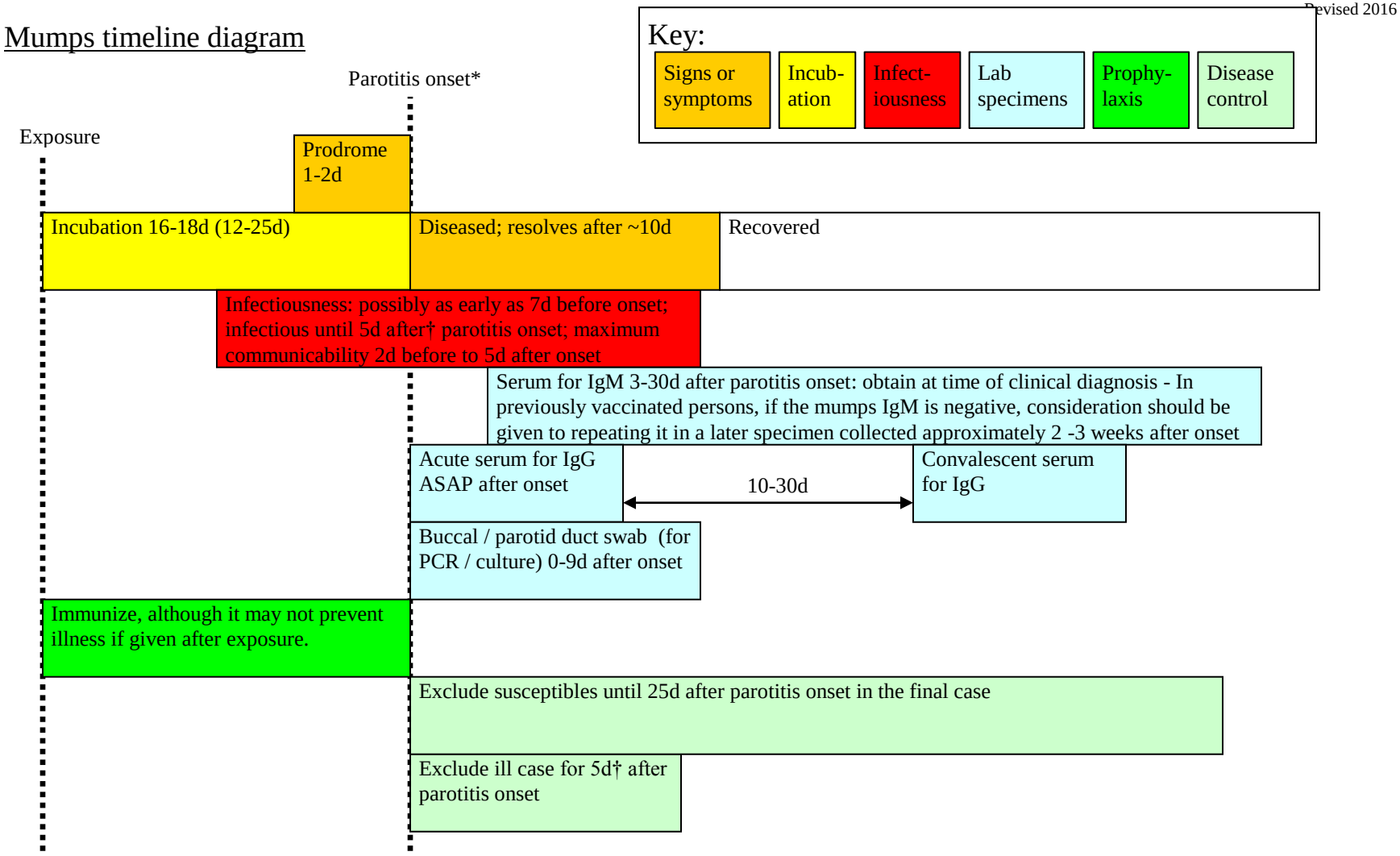
Mumps timeline diagram



* Up to 60% of mumps cases may lack parotitis. Such cases can still transmit disease. All references to 'onset' above are to parotitis onset. If the case lacked parotitis, use onset of other symptoms (e.g., fever, malaise).

† Centers for Disease Control and Prevention Mumps, Updated Recommendations for Isolation of Persons with Mumps, MMWR 2008;57:1103-1105

Sources: APHA Control of Communicable Diseases Manual, AAP Red Book, CDC Pink Book, CDC VPD surveillance manual