Kansas Department of Health and Environment
Division of Health

Mumps

Investigation Guideline

Contents

Attachments can be accessed through the Adobe Reader's navigation panel for attachments. Throughout this document attachment links are indicated by this symbol; when the link is activated in Adobe Reader it will open the attachments navigation panel. The link may not work when using PDF readers other than Adobe Reader.

Effective Date: 09/2008 Published Date: 05/11/2018
Current version: 05/2018 Last Updated: 02/18/2018

Revision History:

Date	Replaced	Comments
05/2018	04/2017	Updated Notification sections and Isolation, Work and Daycare Restrictions sections with updated regulations.
04/2017	11/2015	Modifications to Laboratory Analysis section to address collection of buccal swabs within 5 days; Investigator's Responsibilities section modified to include instances when contact investigation can be delayed, Managing Special Situations Healthcare Care Settings suggestion of serological testing after exposure was removed. Managing Special Situation Outbreaks section's outbreak definition modified. Throughout document, adjustment of recommended infectious period for contact tracing to 2 days before and five days after parotitis onset. Without parotitis, consultation with KDHE was suggested. (Source: Centers for Disease Control and Prevention. Manual for the Surveillance of Vaccine-Preventable Diseases: Chapter 9-Infectious Period. Centers for Disease Control and Prevention, Atlanta, GA, 2008.)
11/2015	07/2012	Updated laboratory section with KHEL testing information and specimen collection information. Updated Notification, Investigator Responsibilities, and Data Management sections with disease surveillance indicator targets. Contact Investigation: clarification of exposures. Work restrictions: more detail added on "respiratory isolation."
07/2012	02/2012	Added reporting form. Minor typographical errors. Updated fact sheet. Minor errors fixed on rapid assessment worksheet.
02/2012	07/2011	2012 case definition. Revised worksheet and case listing. Removed references to KS-EDSS. Updated healthcare workers exclusion and presumptive immunity from ACIP 2011 recommendations.
07/2011	09/2008	Modified case definition to 2010 CDC version; format changes in Investigation Protocol; edits to Fact Sheet, Laboratory Analysis, Contact Investigation, Isolation and Restrictions, and Managing Special Situation. Replaced Mumps Supplemental Form with a more recent version. Added Rapid Assessment Worksheet

Mumps
Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 2012)

Suspected:

- 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.

Comment: With previous contact with mumps virus either through vaccination (particularly with 2 doses) or natural infection, serum mumps IgM test results may be negative; immunoglobulin G (IgG) test results may be positive at initial blood draw; and viral detection in RT-PCR or culture may have low yield if the buccal swab is collected too long after parotitis onset.

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.

States may also choose to classify cases as “out-of-state-imported” when imported from another state in the United States. For national reporting, however, cases will be classified as either internationally imported or U.S-acquired.

LABORATORY ANALYSIS

Important: Contact KDHE-BEPHI (1-877-427-7317) by phone within 4 hours of a mumps case being suspected.

At the **first** health care provider visit, persons suspected of having mumps should have a buccal swab collected for PCR if within the appropriate timeframe.

- The buccal swab can be sent to the Kansas Health and Environmental Laboratories (KHEL) for PCR testing after prior authorization.
    - Contact KDHE's epidemiology hotline at 877-427-7317 for authorization before shipping a buccal swab specimen.
    - Buccal swab: Collect with a commercially supplied, sterile Dacron or polyester-tipped swab with a plastic or aluminum shaft that is placed in Viral Transport Media (VTM).
        - If possible, collect within 3 days of parotitis onset.
        - Do not collect more than 5 days past parotitis onset.
        - Do not use cotton or calcium alginate-tipped swabs or those with wooden shafts.
        - The buccal cavity is the space near the upper rear molars between the cheek and teeth. Massage the parotid (salivary) gland for 30 seconds and then swab the area between the cheek and gum by sweeping the swab near the upper molar and lower molar area.
        - Refer to Illustration of Parotid Gland and Instructions for further guidance (www.cdc.gov/mumps/lab/detection-mumps.html)
    - Specimens are to be refrigerated and shipped in insulated boxes with cold packs. Refer to KHEL instructions for viral specimen packaging at:
        - www.kdheks.gov/labs/downloads/Virus_pictorial_guide.pdf and
        - www.kdheks.gov/labs/downloads/Universal_Form_Instructions_Handout.pdf
    - Properly packaged and approved specimens should be mailed to:
      Kansas Health and Environmental Laboratories
      Attention: Virology/Serology Unit
      6810 SE. Dwight Street
      Topeka, KS 66620
- Serology specimens should be sent to a commercial reference laboratory for IgM and IgG titers. KDHE recommends serology testing in persons that are not vaccinated. Serology results in vaccinated persons can be difficult to interpret.

- Blood, 3-5 mL collected in serum clot separator tubes, collected at two different times during illness (acute and convalescent).
  - First: Collect within 3-7 days after parotitis onset
    - If first specimen is collected ≤3 days after parotitis onset in an unvaccinated person, collect a second IgM specimen 5-7 days after parotitis onset.
  - Second: Collect if the first IgM test is negative. Collect 2 weeks after first specimen.

For additional information, call the KHEL at (785) 296-1620 or refer to:

- CDC Surveillance of Vaccine-Preventable Diseases: Chapter 9 Mumps: www.cdc.gov/vaccines/pubs/surv-manual/chpt09-mumps.html
- Comparison of laboratory tests:

Detection of	Specimen	Unvaccinated Person	Vaccinated Person
IgM Antibody	Acute Serum IgM positive indicates current/very recent infection or reinfection.	Detectable within 5 days of symptoms, peaks at about 1 week after onset, and remains elevated for several weeks or months. *For the unvaccinated, if collected ≤3 days after parotitis onset and IgM is negative, a second sample should be collected 5-7 days after symptoms onset, and a second negative IgM result rules out mumps only if the IgG is also negative.*	Highly variable may be absent or short-lived, and false-positive and false-negative results are possible. ***Absence of IgM does not rule out mumps in a vaccinated person.***
IgG Antibody	Acute and/or Convalescent Serum	Increases rapidly after symptom onset and is long-lasting.	May already be quite elevated in acute-phase blood sample, which may prevent detection of a fourfold rise in titer in the convalescent sample.
Virus	Buccal swab	May be isolated from the buccal mucosa from 7 days before until 8 days after salivary enlargement. Maximal viral shedding occurs just prior to and within the first 3 days of parotitis onset.	Best to obtain swab within 3 days of symptom onset, otherwise viral detection may have a low yield.

EPIDEMIOLOGY

Mumps occurs worldwide and is endemic year-round with peaks in the winter and spring. In the United States the incidence of mumps has declined significantly since the vaccine was introduced in 1967. In 1986-87 there was a resurgence of mumps nationwide due to the absence of national vaccination policies and vaccine failure. Since the 2-dose MMR vaccination policy, the incidence of reported mumps cases reported has declined steadily. Outbreaks in vaccinated populations can occur and are usually linked to vaccine failure. Not all cases of parotitis are due to mumps. Parotitis can be caused by parainfluenza virus types 1 and 3, Epstein Barr virus, influenza A virus, Coxsackie A virus, echovirus, lymphocytic choriomeningitis virus, human immunodeficiency virus, and noninfectious causes such as drugs, tumors, immunologic diseases, and obstruction of the salivary duct.

DISEASE OVERVIEW

A. Agent:
Mumps is a member of the Paramyxoviridae family, genus *Rabulavirus*.

B. Clinical Description:
Acute viral disease with fever and swelling of one or more of the salivary glands: parotid, sublingual or submandibular glands. The prodromal symptoms are nonspecific, and include myalgia, anorexia, malaise, headache, and low-grade fever. Parotitis, when present, tends to occur within the first 2 days of prodromal symptoms. (Source: CDC Pink Book, 2015) Some people may experience very mild symptoms or no symptoms. Adolescents and adults have more severe illness than young children. Orchitis, usually unilateral, occurs in 20-30% of post-pubertal males and oophoritis in approximately 5% of post-pubertal females; sterility is extremely rare. Symptomatic meningitis occurs in up to 10% of cases. Pancreatitis, neuritis, arthritis, mastitis, nephritis, thyroiditis and pericarditis may occur. Mumps infection during the first trimester of pregnancy may increase the rate of spontaneous abortion but there is no firm evidence that mumps during pregnancy causes congenital malformations.

C. Reservoirs:
Humans.

D. Mode(s) of Transmission:
Direct contact with infected person, droplet spread and indirectly by fomites freshly soiled with the saliva of an infected person.

E. Incubation Period:
Average 16-18 days, range 12-25 days.

F. Period of Communicability:
The virus has been isolated from saliva from 7 days before overt parotitis and 9 days after. Maximum infectiousness occurs between 2 days before and 4 days after onset of illness with the initial day of swelling counted as day 0. Unapparent infections can be communicable.

G. Susceptibility and Resistance:
Immunity is life-long after clinical or inapparent infections. Adults born before 1957 are likely to have been infected naturally and are considered immune.

H. Treatment:
Supportive only.

I. Vaccination:
Live attenuated mumps virus vaccine is available in combination vaccines. Two doses of mumps-containing vaccine are recommended routinely for children; with the first dose at age 12 through 15 months and the second dose at ages four through six years (school entry). Two doses are also recommended for adults at high risk, including international travelers, college and other post-high school students, and health care personnel born during or after 1957. All other adults, born during or after 1957, without other presumptive evidence of mumps immunity should be vaccinated with one dose of mumps containing vaccine.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

All confirmed or ***suspected*** mumps cases shall be reported within **4 hours by phone**:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)
4. KDHE-BEPHI contacts the local public health jurisdiction by phone within one hour of receiving a mumps report

Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
24/7 Phone: 1-877-427-7317

As a nationally notifiable condition, confirmed mumps cases require a STANDARD report to the Center of Disease Control and Prevention (CDC).

1. STANDARD reporting requires KDHE-BEPHI to file an electronic report for in next regularly scheduled electronic transmission.
    - KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested as soon as possible, completing the electronic form within 3 days of receiving a notification of a mumps report.

INVESTIGATOR RESPONSIBILITIES

1) Report all confirmed, probable, and suspected cases to the KDHE-BEPHI.

2) Begin the public health investigation within 1 day of receiving a report.

3) Use the Mumps Rapid Assessment Worksheet to collect important data.

4) Contact medical provider to collect additional information and confirm diagnosis using the current case definition.

- Collect all information requested in Step 1) of case investigation.
- Ensure that the patient is aware of his/her diagnosis and has been informed to remain in isolation 5 days following parotitis.

5) Conduct case investigation starting within 1 day of receiving the report and completing the initial case investigation within 3 days of receiving a report.

- Potential exposure and transmission settings should be evaluated.
- If there is no known exposure (low suspicion of mumps) and no high risk transmission setting (unvaccinated contacts), wait for laboratory results and a final diagnosis prior to starting the contact investigation.
- If there is a possible exposure (high suspicion of mumps) or a potential high risk transmission setting (unvaccinated contacts), the investigator should immediately start the contact investigation.

6) Situations of major public health concern include:

- A suspect case that traveled to a country with endemic mumps or an area experiencing a mumps outbreak within his/her exposure period.
- A suspect case that attended a daycare or school with unimmunized or under-immunized children during his/her infectious period.
- A suspect case who provided direct patient care to unimmunized or under-immunized individuals during his/her infectious period.
- A suspect case who resides in an under-immunized community.

7) Conduct contact investigation to locate additional cases and/or contacts.

- A contact investigation will not be needed if:
  - The case is a low suspicion of mumps, the PCR is negative, and an alternative diagnosis is available for parotitis.
  - The case is a low suspicion of mumps, PCR is negative without an alternative diagnosis, and no high risk transmission settings or situations of public health concern were identified.

8) Initiate control and prevention measures to prevent spread of disease.

9) Record data, collected during the investigation, in the KS EpiTrax system under the data's associated [tab] in the case morbidity report (CMR).

10) As appropriate, use the notification letter(s) and the disease fact sheet to notify the case, contacts and other individuals or groups.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

1) Contact the medical provider who reported or ordered testing of the case to obtain the following from the patient's medical records.

   - Collect information on any other diagnoses being considered, requesting the related labs.
   - Examine the symptoms that the medical provider attributes to mumps:
     - Any parotitis or other salivary gland involvement (jaw pain, tenderness, swelling, submandibular and/or sublingual). [Investigation-Symptoms]
     - Other symptoms: headache, anorexia, fatigue, fever, body aches, stiff neck, difficulty in swallowing, nasal congestion, cough, earache, sore throat, nausea, abdominal pain. [Investigation-Symptoms]
   - Date of earliest symptom onset [Clinical]
   - *Parotitis onset* [Investigation-Symptoms]
   - *Duration of parotitis: Has it been longer than 2 days?* [Investigation-Symptoms]
   - Examine the laboratory testing that was done and make note of date(s) specimen(s) were collected (to compare to symptom onset) [Laboratory]:
     - Coordinate further testing if needed.
     - Was there any testing to rule out mumps? (See Epidemiology for differential diagnoses for parotitis.)
     - For pending laboratory results: request name of performing laboratory and when results are expected
   - Record date diagnosed - presumptive and final diagnosis date [Clinical]
   - Record hospitalizations: location and duration of stay
   - Record outcomes: survived or date of death [Clinical]
   - Record complications (i.e., meningitis, deafness, encephalitis, orchitis, oophoritis, mastitis, pancreatitis, etc.) [Investigation-Complications]
   - Collect case's demographics and contacting information (address, birth date, gender, race/ethnicity, primary language, and phone number(s)) [Demographic]
   - Through a credible immunization registry or medical record obtain information on history of mumps vaccine [Investigation-Vaccination History]:
     - Dates of vaccination;
     - Number of doses after 1st birthday or why not vaccinated.

2) Interview the case to determine source, risk factors and transmission settings:

- Focus on incubation period 12-25 days prior to symptom onset and on a communicable period 2 days before to 5 days after symptom onset.
  - When parotitis is present, use the first day of swelling as day 0.
  - When parotitis is not present, the first day of other symptoms is day 0; consider extending the infectious period (consult with KDHE-BEPHI).
  - Record case's activities during the 12-25 days prior to and 2 days before to 5 days after onset on the [Investigation-Exposure] tab in EpiTrax.
- Examine exposure to others with mumps- like illness [Investigation-Exposure].
  - Obtain dates of exposure,
  - Name and the date of birth of possible sources,
  - Possible source's relationship to case and transmission setting
- Travel history of case 18 days prior to illness onset, with dates of exit from and reentry to Kansas. [Investigation-Exposure].
  - Include dates of travel to other counties in the travel history.
- Any close contact settings: parties, athletic teams, camps, schools and college, residence halls, other group living situations, etc. [Notes]
- Record epidemiological information: [Epidemiological]
  - Examine case's contact-oriented associations with: healthcare, group living, and daycare or school association, making note of case's grade and teacher or specific occupation.
  - If yes is recorded for any contact-oriented associations, record place of potential exposure (where they could have acquired or transmitted illness) this includes daycare, school and group living locations.
  - Note travel dates and locations to record where the infection was most likely imported from. (Indigenous/ or out-of- county, state, or U.S.)
- Collect information from case for the Contact Investigation. (See below).
- If parotitis duration has been less than two days, schedule a time for a follow-up interview.(See Case Management)

3) Investigate epi-links among cases (clusters, household, co-workers, etc).

- If the patient had contact with person(s) who have/had a mumps-like illness, determine if the other "cases" were seen by a medical provider and if they were reported to the state:
  - Search the state electronic surveillance for the possible case.
  - If found, record the previously reported record number in the record of the case you are investigating [Notes].

- Suspected mumps in persons that have not previously been reported should be investigated as a potential case and reported to KDHE-BEPHI if evidence is collected that supports the case definition.
  - Enter the patient's contact who exhibited mumps-like illness on the [Contact] tab of the CMR and click "Save" to update the CMR.
  - After the update, click 'Show Contact' on the symptomatic contact's row.
  - With the View Contact open in show mode, select 'Promote to CMR'.
- For suspected Outbreaks refer to Managing Special Situations section.

Contact Investigation

1) Identify and record all of the case's occupations and activities while infectious.
   - Mumps Infectious Period: For investigation purposes and contact tracing the infectious period is 2 days before till 5 days after onset of parotitis which is counted as day 0.
     - When parotitis is not present, the first day of other symptoms is day 0; the infectious period may need to be extended (consult with BEPHI).
2) Potential contacts will be evaluated by the cases activities and risk of exposure.
   - Types of contacts can include:
     - Household: All household contacts of a case.
     - Daycare: All direct caregivers and room/classmates of case.
     - School: Classmates, educators, and close personal contacts.
     - Work and Social contacts: Coworkers and other social contacts sharing the same space of a case where a high-likelihood of transmission of respiratory droplets would require close proximity (<3 feet).
     - Healthcare workers (HCW) and patients: All direct caregivers of a case-patient or all patients cared for by a potentially infectious HCW
   - Exposure is defined as:
     - Direct contact to a case's respiratory secretions. (e.g., an explosive sneeze or cough in the face, sharing food, sharing eating utensils during a meal, kissing, mouth-to-mouth resuscitation, or performing a full medical exam with the examination of the nose and throat).
     - Sharing a confined space in close proximity to an infectious case for a prolonged period of time, such as >1 hour, may increase the risk for exposure to secretions.
     - Unprotected exposures for healthcare personnel are defined as being within three feet of a patient with a diagnosis of mumps without the use of proper personal protective equipment (droplet precautions).

- Close contacts are those who have cared for or lived with a case or have been in a setting where there was a high likelihood of contact with respiratory droplets and/or body fluids of such a person.
  - High-likelihood of contact would require close proximity because droplets do not remain suspended in the air and generally travel short distances.

3) Create a line listing of close contacts to the case for each possible transmission setting [Contact].

- Record potential contacts in each setting.
- Identify each contact's age, primary residence, and contacting information.
- Type, duration, and date(s) of exposure.
- Any symptoms of mumps in contacts.
- Information on immunization status
- Information on the contact's occupation.
- Note any school or daycare attendance. (Include facility name and location.)

4) Rapidly assess if any contacts are potentially high risk contacts and attempt to assess those individuals' susceptibility to mumps first (see step 5).

- High risk contacts: ***susceptible*** contacts who are at higher risk of disease complications or who could expose other high risk/susceptible contacts
  - Pregnant women (refer to their obstetrician).
  - Immunosuppressed individuals (refer to their healthcare provider);
  - Infants <12 months of age (refer to their pediatrician); or
  - Health care workers providing direct patient care

4) Identify individuals without presumptive evidence of mumps immunity who are considered susceptible, including those with medical or religious exemptions.

- Presumptive evidence of immunity for **non-healthcare** personnel, based on 2006 ACIP Recommendations, at least one of the following conditions:
  - Written documentation of ≥1 doses of mumps-containing vaccine on or after the 1st birthday for preschool-aged children and adults not at high risk; or
  - Written documentation of 2 doses of mumps-containing vaccine for school-aged children and high risk adults (i.e. international travelers, and students at post-high school educational institutions); or
  - Laboratory evidence of immunity; or
  - Birth before 1957; or
  - Documentation of physician-diagnosed mumps.

- Presumptive evidence of immunity among **healthcare** personnel, based on *ACIP Recommendations (2011),* ***at least*** one of the following:
  - Documentation of 2 doses of live mumps containing vaccination, or
  - Born before 1957, or
  - Laboratory evidence of immunity (i.e., positive mumps IgG), or
  - Laboratory confirmation of past disease.

5) Institute control measures for school or day-care contacts as indicated under Isolation, Work and Daycare Restrictions.

6) Follow-up close contacts as recommended under Contact Management.

7) Define potential transmission setting(s):

   - Identify possible transmission settings through information on contacts' mumps vaccination status, immune status, and recent significant illnesses.
   - Define each setting by age, vaccination and immune status.

8) Institute control measures as indicated under Isolation, Work and Daycare Restrictions.

9) All attempts to follow-up with all susceptible contacts, especially the high risk contacts, as instructed under Contact Management.

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for Mumps:

Control of Cases

- For each person hospitalized with a case, droplet precautions shall be followed for nine days from the onset of any symptoms and at least five days after the onset of parotitis.
- Each person with a case shall remain in home isolation for nine days from the onset of any symptoms and at least five days following the onset of parotitis, except when seeking medical care.

Control of contacts

- Each susceptible contact shall be excluded from working in an adult care home, correctional facility, or health care facility and attending or working in a school, child care facility, or adult day care from day 12 to day 25 after exposure to an infectious case.

1) When a person in home isolation seeks medical care, a surgical mask should be worn at all times and contact with others minimized.
2) Voluntary exclusion measures: In addition to K.A.R. 28-1-6 exclusions, the exposed, susceptible contacts should avoid public settings and/or limit exposure to susceptible individuals from day 12 of first exposure until after day 25 of last exposure.

3) Vaccination of susceptible persons: MMR vaccination has not been shown to prevent mumps in persons already infected, but it will prevent infection in those who are not infected. If susceptible persons can be vaccinated early in the course of an outbreak, they can be protected from the additional cases that are expected to occur for at least 3 weeks among susceptible, infected persons.

   NOTE: Mumps vaccine cannot be used after an exposure to prevent mumps. Unvaccinated health personnel who receive a 1st dose of vaccine after an exposure should still be excluded.

Case Management

1) Assure proper isolation measures are started as soon as mumps is suspected.
   - Isolation inside a household may not be feasible, but cases should refrain from contact outside of the household for five days from the onset of parotitis and limit contact with susceptible individuals in the household.

2) Initiate outbreak control measures appropriate to setting.
   - If necessary, reference the Kansas Community Containment SOG for templates concerning isolation measures.

3) Conduct a follow-up as needed to assure compliance with control measures, including work, school or daycare restrictions.

4) Conduct a follow-up interview to determine duration of parotitis and complications, if needed. [Clinical]

5) Report any additional complications or patient status changes.

Contact Management

1) High risk contacts requiring referral:

   - Pregnant women: refer to their obstetrician
   - Immunosuppressed individuals: refer to their healthcare provider
   - Infants <12 months of age: refer to their pediatrician

2) Immediately immunize all other susceptible persons in the potential transmission setting:

   - Two doses of mumps containing vaccine are recommended for those over 1 year of age. Doses must be given at least 28 days apart.
   - Immune globulin (IG) is of no value post-exposure and is not recommended.

3) Provide education to all contacts on the benefits of vaccination, incubation period and symptoms of disease and precautions to take if symptoms develop.

- Instruct that the MMR vaccination has not been shown to prevent mumps in persons already infected, but it will prevent infection in those who are not infected. If susceptible persons can be vaccinated early in the course of an outbreak, they can be protected from the additional cases that are expected to occur for at least 3 weeks among the other susceptible, infected persons.
- Because one dose of MMR vaccine is between 73–91% effective in preventing mumps and two doses is 76–95% effective, some vaccinated contacts may remain at risk for infection.
- All contacts should be educated about symptoms of mumps, including non-specific presentations, and should be instructed on who to notify and what precautions to take if they develop these symptoms.

4) Monitor contacts for symptoms and start active surveillance for additional cases 12-25 days after last potential exposure.

5) Maintain records on all susceptible contacts: symptoms screening, immunization histories, immunization recommended/completed, exclusions, and the disposition of the contact after 25 days of active surveillance, including any missing or gone explanations (MOGE). [Contact-'Edit Contact']
   - Use the contact listing to record and report outcomes (maintain listings for 25 days after exposure).
   - Report any adverse event that occurs after the administration of a vaccine to Vaccine Adverse Events Reporting System at http://vaers.hhs.gov/index

6) Symptomatic contact: investigate and report to the state as a case; initiate any work, school, or daycare restrictions. A contact meeting the clinical case definition can be considered a confirmed or probable case depending on the lab confirmation status of the source case.
   - Report and manage as mumps case and refer for medical care.

     (On the [Contact] *Tab of the CMR, click 'Show' beside the contact on the listing. When View Contact Event opens in show mode, select 'Promote to CMR.)*

7) Hospital Personnel: To decrease nosocomial infection, immunization programs should be established to ensure that health care professionals who may be in contact with cases are immune to the disease.
   - See Medical Settings under Special Situations for more information.

Education

1) Provide education that includes basic information about the disease and its complications and ways to treat and prevent transmission of illness.

2) Instruct cases and contacts on the necessary isolation or any other restrictions.

3) Counsel contacts to watch for signs or symptoms of mumps occurring within 12-25 days after exposure and to seek medical care promptly.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

Outbreak definition: Three or more cases linked by time and place.

The main strategy for controlling a mumps outbreak is to 1) restrict activities of infectious cases, 2) define the at-risk population(s) and transmission setting(s), 3) rapidly identify and vaccinate persons without presumptive evidence of immunity who are exposed to the setting; or, if a contraindication to vaccination exists, to exclude persons without presumptive evidence of immunity from the setting to prevent exposure and further transmission.

Steps to Consider during the Outbreak Investigation:

- Notify KDHE-BEPHI immediately, 1-877-427-7317.
- Organize and maintain all data related to outbreak:
  - Construct and maintain case listing which includes:
    - Record Number, name, DOB (or age) and other demographics,
    - Number of doses of mumps vaccine received
    - Symptoms (parotitis, other) and onset date and duration
    - Source of exposure (i.e., case record number, setting, classroom),
    - Specimen collection date and lab results,
    - Complications and hospitalizations
    - Case status (i.e., confirmed, probable, suspect, not a case)
  - Prepare a listing of close contacts, as directed in Contact Management**,** organized by group setting and source case record number.
  - For each affected setting attempt to determine the vaccination coverage, age distribution, and presence of any high risk contacts.
  - Document measures that have been taken so far in the response and attempt to identify reasons for the outbreak.
    - All epidemiologic data will be reported and managed through the Kansas outbreak module of the electronic surveillance system.
- Assemble a response team made up of local and state public health officials to accomplish the following:
  - Identify population(s) at risk of infection based on the information collected in the case and contact investigations. Define:
    - Person: who is becoming ill (i.e., age, gender, occupations, immunization status)
    - Place: where are the cases and to what settings or activities are they associated (i.e. household, organization, community)
    - Time: when did it start (onset dates) and is it still going on
  - Predict and prepare for future cases; agree upon a clear strategy of

response that outlines control measures to be accomplished.

- Inventory resources available to apply to response (vaccine and staff) and determine what resources are still needed
- Define and assign responsibilities to accomplish the outlined measures.
- Plan for further communications and assessments of response.

- Enhance surveillance and perform active case finding:
  - Obtain clinical specimens for viral isolation from at least some of the cases in each outbreak at the time of the initial investigation.
  - Maintain active surveillance with medical providers serving the affected communities for two incubation periods from last confirmed case.
  - Use the attached Sample Letter for Medical Facility Notifications.
  - For outbreaks in schools, review the School and Child Care Settings.
  - For medical facilities, review Health Care Settings.

B. School and Child Care Settings:

- Coordinate activities with school nurse and/or administration.
- Exclude case from setting until 5 days after onset date of parotitis.
- Identify potential contacts based on patterns of interaction with case:
  - Classmates, roommates, educators and teammates are to be considered close contacts.
  - Home childcare: All children, the child-care provider and members of his/her family who have had contact with case are close contacts.
  - Other contacts are evaluated based on extent of exposure.
- Create listing(s) of close contacts; perform the following for each contact:
  - Evaluate for mumps illness.
  - Assess immunization status; i.e. vaccination or history of mumps
  - Refer symptomatic contacts to health care providers for treatment and testing and exclude them from school until 5 days after parotitis onset.
  - Exclude susceptible contacts from the setting for day 12 to day 25 after exposure to an infectious case.
  - Recommend all susceptible contacts obtain vaccinations.

  Note: MMR vaccination has not been shown to prevent mumps in persons already infected, but it will prevent infection in those who are not infected. Vaccination of susceptible persons early in the course of an outbreak will protect those individuals that are not yet infected from exposure to cases that are expected to occur at least 3 weeks after the initial exposures.
- Maintain a log of symptomatic contacts referred for medical evaluation and testing and of contacts that required vaccination or exclusion.
  - Follow-up to see outcomes of referrals and exclusions.

- Notify the parents of the children in the setting to:
  - Verify their child's immunization status
  - Advise them to report any mumps like illness occurring within 25 days of the infectious case last being in the setting and to seek medical care for diagnosis and appropriate treatment.
  - The attached sample letter to parents may be used as a guide.
- Surveillance: Conduct active surveillance for 2 incubation periods (i.e., 50 days) after onset of the last case.
- Reference K.A.R. 28-1-20 for immunization requirements for the current school year; on-line at: www.kdheks.gov/immunize/schoolInfo.htm.
- Outbreak Control Measures in School Settings:

  When *on-going* outbreaks are identified in school or daycare setting(s) that require additional control measures, the following recommendations may be instituted by local public health authorities:
  - Attendees, students or employees with 0 doses of mumps-containing vaccine and no other acceptable evidence of mumps immunity are excluded from daycare/school/colleges affected by the mumps outbreak or other unaffected schools that are deemed by local public health authorities to be at risk for transmission of disease.
  - Excluded individuals that have not been exposed to a known case prior to age appropriate vaccination are readmitted to the setting only after receiving age appropriate vaccination.
  - Excluded individuals that have been exposed to a known case prior to vaccination shall remain excluded from day 12 of the first exposure through day 25 of the last exposure. (Exposure day counted as day 0.)

C. Health Care Setting (including outpatient and long-term care facilities):

Mumps Control measures include:

1) Isolation of patients in whom mumps is suspected
2) Implementation of respiratory droplet precautions (gown, gloves, and masks as needed) should be used for patient contact. Negative pressure rooms are not required.
3) Assessing presumptive evidence of immunity of healthcare personnel.
4) Vaccination of those without evidence of immunity.
5) Exclusion of healthcare personnel with active mumps illness and those who do not have presumptive evidence of immunity who are exposed to mumps.

Details on specific mumps control measures:

- Isolation of mumps patients

  - Place on droplet precautions through until after day 9 after the onset of any symptoms and at least after day 5 after parotitis onset or; onset is counted as day 0. Precautions can be removed on day 6.
  - Exposed susceptible contacts should be placed on droplet precautions from day 12 of first exposure through day 25 of last exposure. Exposure date is counted as day 0, and precautions may be removed on day 26.

- To assess presumptive evidence of immunity among healthcare personnel, one of the following criteria should be met:
  - Documentation of 2 doses of live mumps containing vaccine, or
  - Born before 1957, or
  - Laboratory evidence of immunity (i.e., positive mumps IgG), or
  - Laboratory confirmation of past disease

  [Source: ACIP Recommendation (2011)]
- Consider the following when considering laboratory evidence of immunity:
  - Detection of mumps specific IgG is evidence of mumps immunity, but
    - Mumps serum immunoglobulin (IgG) equivocal results should be considered negative,
    - Routine serologic testing is **not recommended** for personnel and
    - Post-vaccination serologic testing to verify an immune response to MMR or its component vaccines is **not recommended.**

    Note: The results of serum antibody tests in vaccinated persons are difficult to interpret as antibody levels are often lower than in natural infection and commercially available tests may not detect the low levels.

- Unprotected exposure: Within three feet of a diagnosed mumps patient without the use of proper personal protective equipment (surgical mask).

- Use of mumps vaccine:
  - The mumps vaccine **cannot** be used to prevent the development of mumps after exposure.
  - Personnel should not be excluded from work for receipt of MMR.
  - There are no data on the effect of additional (greater than two) doses of mumps vaccine on antibody levels or protection from disease.

Management of Healthcare personnel:

- Personnel born before 1957, without laboratory evidence of immunity or confirmation of disease, do not need to be excluded from work following unprotected exposure.
  - ***Consider*** vaccinating such personnel with 2 doses of MMR vaccine at

the appropriate interval before an outbreak or exposure, or

  - During a mumps outbreak, ***recommend*** 2 doses of MMR vaccine.

- Personnel without acceptable presumptive evidence of immunity prior to unprotected exposure should be:
  - Excluded from day 12 after the first unprotected exposure to mumps through and including day 25 after the last unprotected exposure. (The exposure date is day 0.)
  - Educated about mumps symptoms, including non-specific presentations, and about the notification procedures to follow if symptoms develop.
- Personnel with partial vaccination (1 dose):
  - May continue working following an unprotected exposure to mumps.
  - Should receive a 2nd dose as soon as possible, but no sooner than 28 days after the first dose.
  - Should be educated about mumps symptoms, including non-specific presentations, and about the notification procedures to follow if symptoms develop.
- Personnel who have presumptive evidence of immunity
  - Do not need to be excluded from work following an unprotected exposure.
  - Some vaccinated personnel may remain at risk for infection. Therefore, healthcare personnel should be educated about mumps symptoms, including non-specific presentations, and about the notification procedures to follow if symptoms develop.
- Irrespective of their immune status, any personnel who become sick with mumps like illness should be excluded from work through 5 days post parotid swelling onset. They may return on the 6th day.

Surveillance:

- Conduct active surveillance for 2 incubation periods (i.e., 50 days) after onset of the last case. Consult with the facilities infection control practitioner to identify contacts that need to receive a medical evaluation, as soon as possible after a suspect case is detected.
- All contacts should be under surveillance for symptoms for 25 days since their last known exposure. Those reporting symptoms of mumps should be reported to the proper health authority for follow-up and investigation.
- The sample letter to physicians may be helpful in enhancing surveillance activities in the community.

DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Accept the case assigned to the LHD and record the date the LHD investigation and control measures were initiated on the [Administrative] tab.

B. Organize and collect data.
- The Mumps Investigation Form is provided to assist the investigator but does not have to be submitted to CDC or KDHE.
- Investigators can collect and enter all required information directly into EpiTrax [Investigation], [Clinical], [Demographics], [Epidemiological] and [Contact] tabs without using the paper forms.
- During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.

C. Report data collected during the course of the investigation via EpiTrax**.**
- Verify that all data requested in Step 1) has been recorded on an appropriate EpiTrax [tab], or that actions are completed for a case lost to follow-up as outlined below.
- Some data that cannot be reported on an EpiTrax [tab] may need to be recorded in [Notes] or scanned and attached to the record.
- Paper report forms do not need to be sent to KDHE after the information is recorded in EpiTrax. The forms should be handled as directed by local administrative practices.

D. If a case is lost to follow-up, after the appropriate attempts:
- Indicate 'lost to follow-up' on the [Investigation] tab with the number of attempts to contact the case recorded.
- Record at least the information that was collected from the medical records.
- Record a reason for 'lost to follow-up' in [Notes].

E. After the requirements listed under Case Investigation have been completed, record the "Date LHD investigation completed" field located on the bottom of the [Administrative] tab.
- Record this date even if the local investigator's Contact Management for the case is not "Complete".

F. Once case and contact investigations are complete, the LHD investigator will click the "Complete" button. This will trigger an alert to the LHD Administrator so they can review the case before sending to the state.
- The LHD Administrator will then "Approve" or "Reject" the CMR.
- Once a case is "Approved" by the LHD Administrator, BEPHI staff will review the case to ensure completion before closing the case.

(Review the EpiTrax User Guide, Case Routing for further guidance.)

ADDITIONAL INFORMATION / REFERENCES

A. **Treatment / Differential Diagnosis:** Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015:564-568.

B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, Washington, DC, American Public Health Association, 2015.

C. **Case Definitions:** wwwn.cdc.gov/nndss/

D. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm

E. **CDC Pink Book:** Epidemiology and Prevention of Vaccine-Preventable Diseases. Available at: www.cdc.gov/vaccines/pubs/pinkbook/index.html

F. **CDC. Manual for the Surveillance of Vaccine-Preventable Diseases:** Available at: www.cdc.gov/vaccines/pubs/surv-manual/index.html .

G. **CDC. Notice to Readers: Updated recommendations of the Advisory Committee on Immunization Practices (ACIP) for the control and elimination of mumps.** MMWR 2006;55(22):629–30 **.**

H. **CDC. Notice to Readers: Measles, Mumps, and Rubella – Vaccine use and Strategies for Elimination of Measles, Rubella, And Congenital Rubella Syndrome and Control of Mumps: Recommendations of the Advisory Committee on Immunization Practices (ACIP).** MMWR 2013; 62(RR04);1-34.

I. **CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP).** MMWR 2011;60 (7)**.**

J. **Additional Information (CDC):** www.cdc.gov/mumps/index.html

ATTACHMENTS

To view attachments in the electronic version:

1. Go to <View>; <Navigation Pane>; <Attachments> – OR – Click on the "Paper Clip" icon at the left.
2. Double click on the document to open.

Mumps Rapid Assessment Form for the Local Investigator

(Please refer to the Disease investigation Guideline for additional guidance.)

SYMPTOMS(S)	Initial Interview Information Date: _____ Unk.	No	Yes	Onset Date	Duration (days)	Final Interview Information Date of final: _____ Still Swollen (yes / no)	Duration (days)
Any Type of Salivary Gland Swelling (including parotitis)							
Submandibular (below jaw)							
Sublingual (beneath tongue)							
Parotitis (behind jaw angle)							
Bilateral Swelling							
Unilateral Swelling							
Jaw Pain							
Fever				**If yes, highest temperature measured:**			

List any other symptoms (e.g., headache, anorexia, fatigue, body aches, stiff neck, difficulty swallowing, nasal congestion, cough, earache, sore throat, nausea, abdominal pain):

CASE TRAVEL / VISITOR HISTORY (12-25 days prior to onset)				Date Arrive	Date Depart	Location (To / From)
Out of USA						
Out of State						
Out of County						

LABORATORY TESTING				Collection Date	Results
Culture					**Positive / Negative / Indeterminate**
PCR					**Positive / Negative / Indeterminate**
Serology IgM					**Positive / Negative / Indeterminate**
Serology IgG -Acute					**Positive / Negative / Indeterminate**
Serology IgG - Convalescent					**Positive / Negative / Indeterminate**

COMPLICATIONS				Date(s)	Location(s)
Hospitalized					
Died					
Deafness					
Encephalitis					
Meningitis					
Orchitis					
Other				If yes, specify:	

Mumps Vaccination History (i.e. MMR)				Date(s)	Type	Manufacturer	Lot
Dose 1							
Dose 2							
If not vaccinated, reason:							

INITIAL EPI INFORMATION	Unk.	No	Yes	Date(s)	Location(s) or Case Information
School/Daycare/Camp association					
Contact w/ Mumps case					
Household contact of any of above					

Additional Notes (transmission setting / spread setting/occupation):

Mumps Rapid Assessment Form for the Local Investigator

(Please refer to the Disease investigation Guideline for additional guidance.)

Activity History For 25 Days Before Symptom Onset and 2 days before and 5 Days After Onset (Onset=Day 0)		
Day	**Date**	**Activities**
-25		
-24		
-23		
-22		
-21		
-20		
-19		
-18		
-17		
-16		
-15		
-14		
-13		
-12		
-11		Placemarker for dates. Too soon to be exposed and not yet infectious.
-10		
-9		
-8		
-7		
-6		
-5		
-4		
-3		
-2		
-1		
0		
1		
2		
3		
4		
5		

Mumps Investigation Primary Contact Worksheet Page: _____ of _____

Name of Primary Case: _____ Nickname / Alias: _____

Case Number: _____ Interview Date: _____ Interview Name: _____

Site Name or Place:_____ Infectious Period: _____/_____/_____ Thru _____/_____/_____

(MOGE = Missing or Gone Explanation, Hx= History)

Name (Last, First)	Birthdate or Age	Sex	Location / Address	Phone	Date Notified / Notified By	Contact Type	Date First Exposure / Date Final Exposure	Health Care Worker	Child (<1) Care Worker	Mumps Vaccination	Hx or Mumps	Refer for MMR	Referr for Lab	Excluded (work, school, patient-care)	Call Back Date
		M / F			MOGE, as needed			Y/N	Y/N	1 / 2	Y / N	Y / N	Y / N	w/s/p	

Notified Through: P = Phone/ in person, M = mailed letter
Notified By: LHD =local health department, C= Case, MD = physician

Contact as: H=Household, W=Co-worker, C=Classmate
O=Others within 3 ft. for one hour