Mumps

Revision Dates

Case Definition	August 2011
Reporting Requirements	August 2011
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	August 2011

Case Definition

Confirmed Case

Laboratory confirmation of infection in the absence of recent immunization with mumps-containing vaccine[1]:

- Isolation of mumps virus or detection of viral RNA from an appropriate clinical specimen[2]

OR

- Seroconversion of mumps IgG titre in serum by any standard serologic assay

OR

- Positive serologic test for mumps IgM[3] antibody in a person who has mumps-compatible clinical illness[4]

OR

Clinical illness[4] in a person who is epidemiologically linked to a laboratory-confirmed case.

Probable Case (Outbreak Only)

Clinical illness[4] in the absence of appropriate laboratory tests and not epidemiologically linked to a laboratory-confirmed case.

[1] The most frequent reaction to Measles-Mumps-Rubella (MMR) immunization is malaise and fever (with or without rash) occurring 7-12 days after immunization. Parotitis has occasionally occurred after immunization. However, this should be determined for each case, as these reactions and timeframe can vary (Canadian Immunization Guide, 7th edition).

[2] Appropriate clinical specimens include: swab of saliva or oral fluid collected from the buccal cavity with a Dacron or cotton tip swab OR urine sample (5 ml or more) preferably the first morning sample. Refer to the Provincial Laboratory for Public Health (PLPH) Guide to Services for current specimen collection and submission information.

[3] IgM serology has the potential for false positive findings. If the clinical presentation is inconsistent with a diagnosis of mumps or in the absence of recent travel/exposure history, IgM results must be confirmed by the other confirmatory methods listed above.

[4] Clinical illness is characterized by acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting > two days, and without other apparent cause.

Reporting Requirements

1. **Physicians, Health Practitioners and others**
   Physicians, health practitioners and others listed in Sections 22(1) or 22(2) of the *Public Health Act* shall notify the Medical Officer of Health (MOH) (or designate) of all confirmed cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two days).

2. **Laboratories**
   All laboratories, including regional laboratories and the PLPH shall, in accordance with Section 23 of the *Public Health Act,* report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two days) to the:
   - Chief Medical Officer of Health (CMOH) (or designate),
   - MOH (or designate) and
   - Attending/ordering physician.

3. **Alberta Health Services and First Nations Inuit Health**
   - The MOH (or designate) of the zone where the case currently resides shall forward the preliminary Notifiable Disease Report (NDR) of all confirmed cases to the CMOH (or designate) within two weeks of notification and the final NDR (amendment) within four weeks of notification.
     - In an outbreak situation, the MOH (or designate) of the zone where the case currently resides shall forward the NDR of all confirmed and probable cases to the CMOH (or designate) in the above prescribed form.
   - For out-of-zone reports, the MOH (or designate) first notified shall notify the MOH (or designate) of the zone where the client currently resides by mail, fax or electronic transfer and fax a copy of the positive laboratory report within 48 hours (two days).
   - For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two days) including:
     - name,
     - date of birth,
     - out-of-province health care number,
     - out-of-province/country address and phone number,
     - attending physician (locally and out-of-province) and
     - positive laboratory report (faxed).

Etiology (1)

Mumps is caused by the mumps virus (family Paramyxoviridae; genus *Paramyxovirus)*. It is antigenically related to the parainfluenza viruses. The virus is quickly inactivated by heat, formalin, chloroform, ether, and ultraviolet light.

Clinical Presentation (2;3)

Mumps is an acute infectious disease caused by the mumps virus. Subclinical infection is common. The prodromal period tends to be rather nonspecific and may include a low grade fever, anorexia, malaise, and headache. Parotitis (unilateral or bilateral) is the most common manifestation occurring in 30-40% of infected persons. Pain on chewing or swallowing, especially acidic liquids or foods, such as pickles or citric juice, is one of the earliest symptoms. Sublingual or submandibular glands may also be affected. The virus may be found in the saliva for one to six days before the glands swell and for the duration of glandular enlargement (5-9 days). A laboratory-confirmed case may not exhibit clinical illness, as up to 30% of cases are asymptomatic.

Complications include CNS involvement, orchitis, oophoritis, and deafness. Orchitis occurs in 20-30% of post pubertal males, usually unilaterally. Oophoritis in females occurs less often (5%) and may mimic appendicitis. Sterility is an extremely rare sequela. The CNS is involved in about 15% of cases, either early or late in the disease, most often as aseptic meningitis (resolving in one to three days) and most often without sequelae. Hearing loss caused by mumps was relatively common in the pre-vaccine era and still occurs occasionally. Encephalitis is rare, occurring in 1-10% of patients manifested by a headache and stiff neck. Less common complications of mumps include arthralgia, pancreatitis (4% of cases), prostatis, nephritis, myocarditis, mastitis, polyarthritis and lacrimal gland involvement.

Mumps during the first trimester of pregnancy may increase the rate of spontaneous abortion. There is no firm evidence that mumps during pregnancy causes congenital malformations.

Note: Other causes of unilateral parotitis include bacterial infections, EBV or “mono”, influenza, parainfluenza, and blocked ducts, and should be considered part of the differential diagnosis if there is no contact with a mumps case.(4)

Diagnosis (5-8)

During an epidemic, the clinical diagnosis of mumps is easy, however when cases are sporadic the clinical diagnosis is less reliable.

The IgM antibodies are usually present at the onset of illness (when glands are swollen) and reach a maximum level one week later. They may be present for several weeks or months following the illness, and decline with time (usually four to eight weeks). Recent vaccination with mumps vaccine or MMR can elicit a mumps IgM antibody response.

The IgG antibodies are also detectable at the onset of illness reaching a peak in convalescence, then slowly declining over many years or decades.

Mumps IgM and IgG EIA serologic tests are most commonly available for laboratory diagnosis and confirmation of a suspect case. Recent data shows that mumps IgM antibody can be negative or indeterminate or the IgM response delayed in symptomatic individuals previously vaccinated with one or two doses of mumps-containing vaccine at the appropriate intervals.

Mumps may also be confirmed by isolation of the virus in cell culture inoculated with throat washings (nasopharyngeal swab), saliva, urine or CSF, or by the detection of viral RNA by PCR in these samples.

The virus can be genotyped, either from the isolate or viral RNA. Presently twelve genotypes (from A to L) are recognized. The genotype is invaluable in assisting with the epidemiological investigation of sporadic and outbreak cases.

Samples testing positive at the PLPH, will be referred to the National Microbiology Laboratory for genotyping and reference studies.

Refer to Appendix A: ProvLab Laboratory Testing for Mumps.

Epidemiology (2)

Reservoir

Humans. Monkeys and other laboratory animals have been experimentally infected.

Transmission

Mumps is spread by respiratory droplets, and by direct contact or fomites contaminated with the saliva of an infected person.

Incubation Period

The incubation period is typically 15-18 days, ranging from 12-25 days.

Period of Communicability (6-10)

The range of communicability is from seven days before onset of parotitis to nine days after onset. However, the most infectious period is 1-2 days before onset of parotitis to 5 days after onset.

Host Susceptibility (2;11)

Universal susceptibility. Disease (with or without symptoms) confers permanent immunity. Most individuals born in Canada before 1970 can be considered immune, as they have likely been infected naturally. As well, persons can generally be presumed to be immune to mumps if they have documented evidence of vaccination on or after their first birthday, laboratory evidence of immunity, or a history of laboratory-confirmed mumps disease.

Mumps infection in adulthood generally produces more severe disease. Disease is uncommon in children less than one year of age.

Occurrence

General (2)

Mumps is endemic throughout the world especially in heavily populated areas. The disease may also occur in epidemics where many unimmunized persons are crowded together. Incidence peaks in the late winter and early spring. Mumps may occur at any age, however, the majority of reported cases are in children 5-10 years of age.

Prior to the introduction of vaccine in the United States, epidemics occurred every 2-5 years with peak incidence between January and May. Since the introduction of vaccine in 1967, rates rapidly declined and the seasonal variation was no longer apparent although outbreaks have continued to be reported in immunized populations. Studies in the United States have indicated that 80-85% of adults with or without a history of mumps have serologic evidence of mumps immunity.

Canada (12)

The number of reported cases has decreased by more than 99% since the licensure of mumps vaccine in 1969. In Canada, approximately 500 cases of mumps are reported annually.

Outbreaks of mumps have occurred in Nova Scotia, New Brunswick, PEI, Newfoundland, Quebec, Ontario, Manitoba, Alberta, and British Columbia starting in early 2007 and continued into 2008. The majority of cases were individuals attending post-secondary institutions.

Alberta (4;10;12-14)
Mumps vaccine has been part of the routine immunization schedule since 1982. In 1981, the number of cases in Alberta peaked with over 2,000 cases reported. Historic data from Alberta and Health Canada (1987 to 1999) shows rates highest in children aged 1-4 and 5-9 years.

The incidence of mumps has shown notable variation over the years. In 2005, the number of cases was low (< 20 cases). In 2007 and 2008 Alberta experienced an outbreak, with 266 cases and 286 cases reported respectively. During this time the cases were found to be in an older age cohort of 15 – 39 years of age (75% of cases in 2007 and 87% cases in 2008). The majority of these cases occurred in persons immunized with one or two dose(s) of mumps containing vaccine.

Key Investigation

Single Case/Household Cluster

- Confirm the diagnosis and ensure appropriate clinical specimens (blood, saliva/oral fluid swab, NP swab and urine) have been collected. The individual must be excluded from work, school, or other activities where they may be in contact with susceptible individuals until the diagnosis is confirmed.
- Determine immunization history.
- Determine history of recent travel.
- Determine source of infection.

Control (6;9;15)

Management of a Case

- Individuals with or without documented mumps immunization – exclude from school, work, etc. for five days from the date of parotitis onset.
- **Health care workers** regardless of immunization status - exclude from school, work, etc. for five days after parotitis onset (refer to Appendix B: Algorithm for Assessment and Management of HCW).

Treatment of a Case

- Supportive therapy as indicated. There is no specific treatment for mumps.

Management of Contacts

- No follow-up of contacts is done generally as immunization rates in Alberta are high.
- Known susceptible contacts should be immunized.

Preventive Measures (11)

- In Alberta, preschool children should receive a mumps-containing vaccine (currently MMR) at one year of age and between four and six years of age. Antibody develops in more than 95-99% of all susceptible persons after one dose. The second dose is provided as part of the two-dose measles (MMR) program.
- See the current *Alberta Immunization Manual* for additional mumps vaccine recommendations.

References

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(2) Beers MH. Mumps. The Merck Manual of Diagnosis and Therapy. 18 ed. Whitehouse Station, NJ: Merck Research Laboratories; 2006.

(3) Public Health Agency of Canada. Case Definitions for Communicable Diseases under National Surveillance. Public Health Agency of Canada 2009Available from: URL: http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/index-

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(5) Heymann DL (ed.). Control of Communicable Diseases Manual. 19th Ed ed. Washington, DC: American Public Health Association; 2008.

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(7) Health Canada. Prevention and control of occupational infections in health care. An infection control guideline. Canada Communicable Disease Report 200228S1:69-72.

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(10) Fiebelkorn A, Barskey A, Bellini W, Wallace G. Mumps. Manual for the Surveillance of Vaccine-Preventable Diseases. 4 ed. Atlanta,GA: Center for Disease Control and Prevention; 2010. p. 1-14.

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(13) Alberta Health and Wellness. Alberta Immunization Manual. 2011.

(14) Alberta Health and Wellness. Communicable Disease Reporting System. Alberta Health and Wellness 2010

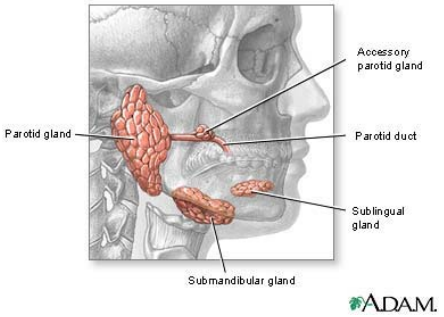
(15) Mandell GL. Mumps Virus. Mandell, Douglas, and Bennet's Principles and Practice of Infectious Diseases. 7 ed. Philadelphia, PA: Churchill Livingstone; 2010. p. 2201-6.

Appendix A

PROVINCIAL LABORATORY FOR PUBLIC HEALTH (MICROBIOLOGY)

Laboratory Testing for Mumps

Background: Recent data shows that mumps IgM antibody can be negative or indeterminate or the IgM response delayed in symptomatic individuals previously vaccinated with one or two doses of mumps-containing vaccine at the appropriate intervals. However, they are positive for mumps virus by nucleic acid testing and/or culture on saliva and urine specimens, and some also seroconvert for IgG antibody. Hence the laboratory diagnosis has been based upon viral culture or nucleic acid testing (NAT) detection of the virus in saliva and urine. The Provincial Laboratory has developed a mumps nucleic acid test (NAT) for saliva and urine samples which should improve the detection rate of acute mumps infections and the turn-around time, as this testing is presently sent to the National Microbiology Laboratory (NML) in Winnipeg. Samples testing positive at the Provincial Laboratory, will be referred to the NML for genotyping and reference studies.



Clinical presentation

Testing should be considered for the individuals presenting with:

- Acute onset of unilateral or bilateral tender, self-limited swelling of one or more salivary glands, lasting >2 days, especially in persons with:
  - recent travel to areas where mumps activity is occurring
  - recent exposure to a probable mumps case
  - compatible symptoms without travel or exposure to a probable mumps case
- Meningitis, encephalitis or neurological symptoms with epidemiological links through travel or contact with probable or confirmed cases

Note: Other causes of unilateral parotitis include bacterial infections, EBV or "mono", influenza, parainfluenza, and blocked ducts, and should be considered part of the differential diagnosis if there is no contact with a mumps case.

Patient information:

- **Complete the ProvLab Virology requisition** *(one per patient for all samples is acceptable)* with all of the following information: ordering physician, patient's name, date of birth, gender, PHN, home address and phone number, specimen type and source, date and time of collection, lab tests required and clinical history
  - **If the information provided is incomplete the sample may be discarded or testing will be delayed pending receipt of this information**
- The ordering physician and office address must be clearly provided. If copies to another physician are required, provide the physician name and complete address where copies should be sent, or they will not be sent

- **Important:** Provide the date of onset of illness, symptoms and whether recently traveled (within the past 3 weeks) and to where. This information will be used to prioritize sample testing and to assist public health in their follow-up.

Transport

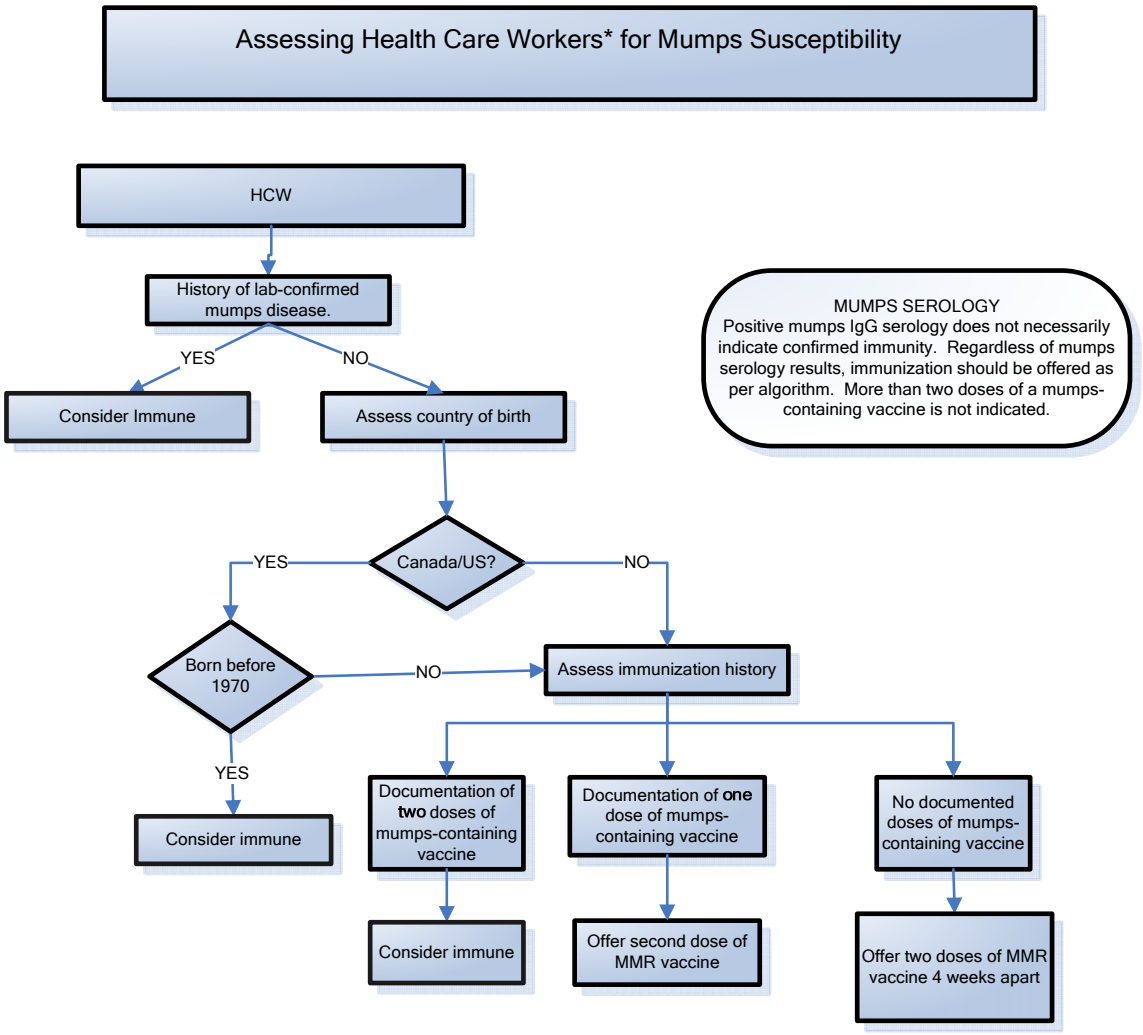
- Send only one sample per biosafety bag, with the sample and absorbent material in the reclosable side, and the requisition in the adjoining pouch. Samples can be sent at ambient temperature if within 8 hours of collection. If more than 8 hours – use a Cold-Pak or ice-pack to maintain the integrity of the sample and virus.
- **If multiple samples are sent in one bag and one or more leak, ALL of the samples may be discarded**.

Laboratory Testing

- Collection of serum and saliva is strongly recommended in all individuals.
- Collection of serum, saliva, **and** urine in individuals with orchitis, oophoritis, and meningitis (see Table below).

Phase	Samples to be Collected (In order of priority)	Test Request	Notes
Acute illness (Up to 10 days after onset of parotitis)	Up to 10 days after onset of parotitis. 1) Blood (3-5 mL in serum separator tube) AND 2) Swab of saliva/oral fluid in Viral Transport medium ALSO Collect 3) Urine in sterile container	Request mumps IgM & IgG antibody on blood (see serology note*) Request mumps NAT for saliva and urine	* Send a follow-up blood sample 7 to 10 days after the acute sample if both mumps IgM antibody and detection of virus are negative. Serology testing for IgM and IgG antibody are performed Monday, Wednesday & Friday **Swab of saliva or oral fluid** collected from the buccal cavity (space between the cheek and back teeth) with a Dacron or cotton tip swab on a plastic shaft. Gently massage the affected gland area for about 30 seconds prior to collecting these secretions on the swab. **Urine samples** (10 mL or more) should preferably be the first morning sample Alert the microbiologist on call (Calgary 403-944-1200 or Edmonton 780-407-7121) to arrange for expedited testing.
Late stage/ convalescence (10 days or more after onset of parotitis)	10 to 14 days after onset of parotitis. 1) Blood (3-5 mL in serum separator tube) AND 2) Urine	Request mumps IgM & IgG antibody (see serology note*) Request mumps NAT for urine	
Immunity determination/ previous exposure	Blood (3-5 mL in serum separator tube)	Request mumps IgG antibody	

Appendix B



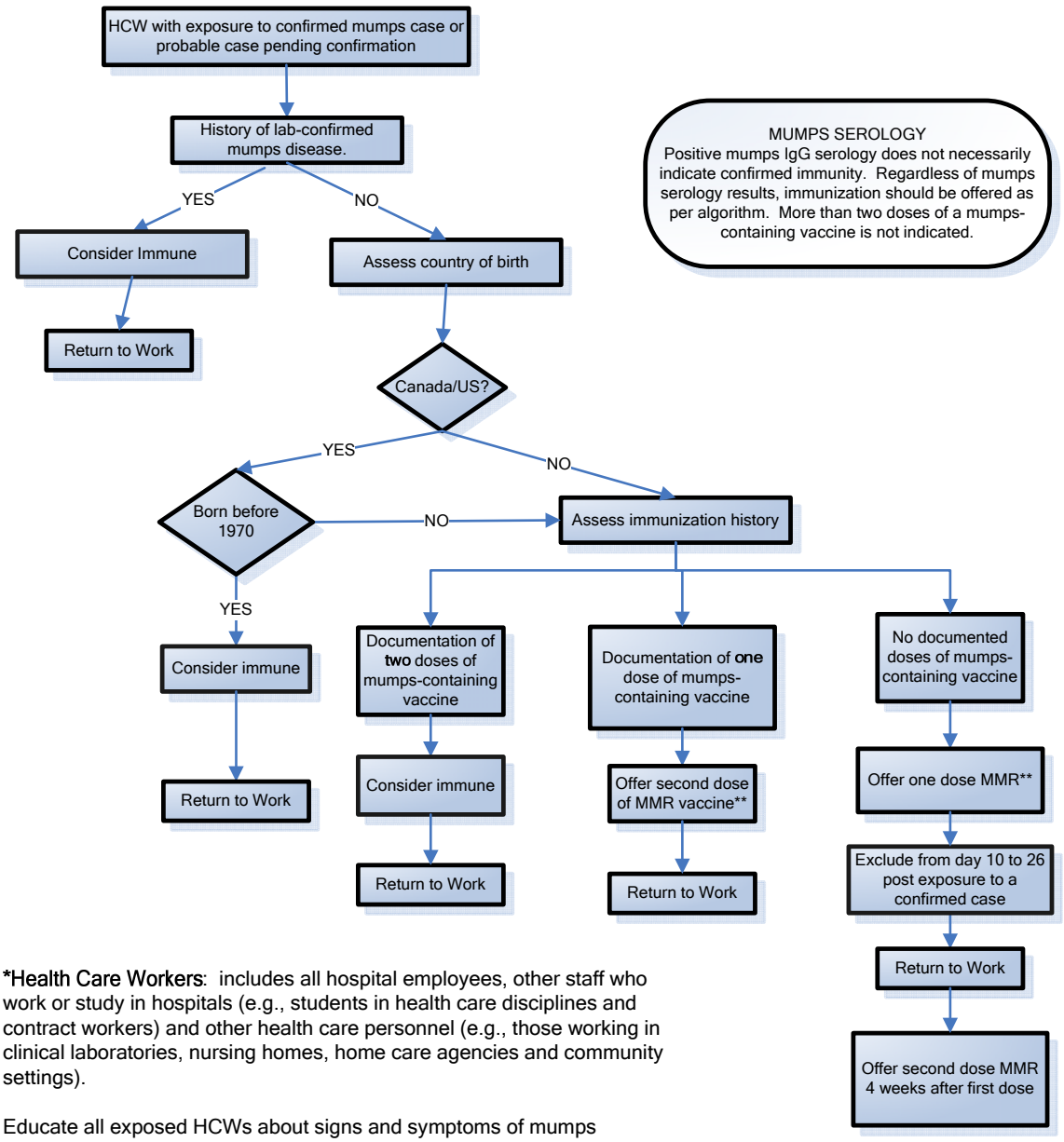
*Health Care Workers: includes all hospital employees, other staff who work or study in hospitals (e.g., students in health care disciplines and contract workers) and other health care personnel (e.g., those working in clinical laboratories, nursing homes, home care agencies and community settings).

Educate all exposed HCW's about signs and symptoms of mumps disease, advise to stay home at first indications of symptoms and contact OHS for assessment.

Mumps vaccine cannot be used to prevent the development of mumps after exposure, but will be useful in preventing mumps for future exposures.

Management of Health Care Workers* who are close contacts of a mumps case

Close contact (exposure) for Health Care Workers: a close contact is defined as an individual providing direct patient care with unprotected (without droplet precautions) face-to-face contact within one metre (three feet) of a confirmed case in the communicable period which is 7 days before and up to 9 days after the onset of parotitis.



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Educate all exposed HCWs about signs and symptoms of mumps disease, advise to stay home at first indications of symptoms and contact OHS for assessment.

Mumps vaccine cannot be used to prevent the development of mumps after exposure but will be useful in preventing mumps for future exposures.
**Vaccine refusal and contraindications: Exclude from day 10 to 26 after exposure.