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1.0 AUTHORITY

BC Public Health Act (2008). Available at http://www.leg.bc.ca/38th4th/3rd_read/gov23-3.htm

2.0 GOAL

Mumps goals for Canada were established at a consensus conference in 1994. B.C. has adopted the national goal to maintain an active prevention program for mumps to minimize serious sequelae from the disease.

This will be accomplished by:

- Delivery of on-time immunization to children at 12 and 18 months of age
- Immunization of previously unimmunized children and adults at opportune health encounters
- Case management and contact follow-up
- Reporting of confirmed, clinical and suspect cases of mumps.

3.0 DEFINITIONS

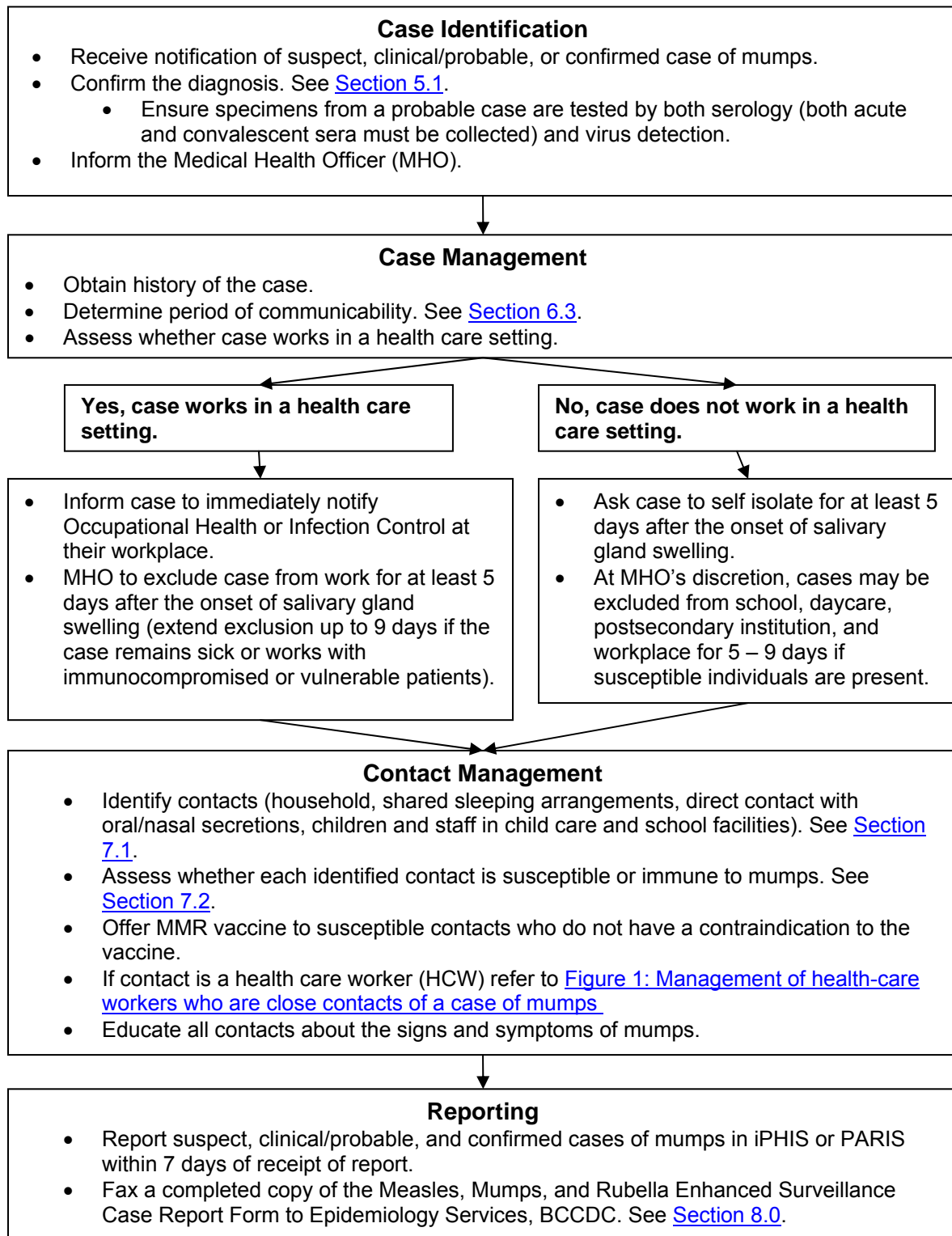
Mode of transmission – airborne transmission and direct contact with saliva or respiratory droplets from the nose or throat, spread through coughing, sneezing, sharing drinks, or kissing, or from contact with any surface that has been contaminated with the mumps virus.

Incubation period – usually 16 – 18 days to onset of prodromal signs and symptoms; ranges from 12 – 25 days after exposure.

Period of communicability - maximum infectiousness occurs between 2 days before to 5 days following the onset of parotid swelling. However, mumps virus has been isolated from saliva from 7 days before through 9 days after onset of swelling and may be detected in urine for up to 14 days after onset of swelling. Inapparent infections can be communicable.

4.0 MUMPS FLOW CHART

The flow chart describes actions to be taken by Public Health when notified of a case of mumps.





5.0 CASE IDENTIFICATION

5.1 Confirm the Diagnosis

Investigate all clinically identified and laboratory reported cases of mumps as soon as possible and complete the individual case report in iPHIS (Integrated Public Health Information System) or PARIS within 7 days.

Inform the local Medical Health Officer.

Surveillance Definitions		Reportable
Confirmed case	<p>Mumps-compatible illness^{①②} and laboratory confirmation of infection in the absence of recent immunization with mumps-containing vaccine (i.e., within the previous 28 days) by:</p> <ul style="list-style-type: none"> • isolation of mumps virus from an appropriate clinical specimen <li style="text-align: center;">OR • detection of mumps virus RNA <li style="text-align: center;">OR • seroconversion or a significant rise (e.g., fourfold or greater) in mumps IgG titre by any standard serologic assay between acute and convalescent sera <li style="text-align: center;">OR • Detection of mumps IgM antibody^③ in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently travelled to an area of known mumps activity <p>OR</p> <p>Mumps-compatible illness in a person with an epidemiologic link to a laboratory-confirmed case</p>	Yes
Clinical / Probable case	Mumps-compatible illness ^② in the absence of laboratory confirmation of infection and not epidemiologically linked to a laboratory-confirmed case.	Yes (“clinical case” in iPHIS)
Suspect case	Illness that could be mumps ^④ but without parotitis or orchitis, in a person who is a contact of a confirmed or clinical mumps case.	Yes

① A laboratory-confirmed case may be asymptomatic and hence not meet the clinical illness description.

② Mumps-compatible illness is characterized by acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, or orchitis, lasting ≥ 2 days, and without other evident cause.

③ IgM serology has the potential for false positive and false negative 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 listed confirmatory methods. In a mumps case that had been previously immunized, the IgM class antibody response may not be detectable.

④ Illness that could be mumps may include myalgia, anorexia, malaise, headache, low-grade fever, or non-specific respiratory symptoms.



6.0 CASE MANAGEMENT

Initiate control measures immediately upon the identification of a case, including a clinical or suspect case. Initiation of control measures must not await laboratory confirmation of the case.

6.1 Laboratory Testing

Probable and suspect cases of mumps should be tested **by both virus detection** (by RT-PCR testing and/or isolation in cell culture) **and serology**. Specimens should be sent to the BCCDC Public Health Microbiology & Reference Laboratory. Notify the medical microbiologist at BCCDC if priority testing is required: [604-707-2627 from 8:30 – 4:30; 604-661-7033 (24 hours, 7 days per week)]. If necessary, contact the BCCDC Public Health Microbiology & Reference Laboratory PHSA Lab Results Line to ascertain test results (1-877-747-2522).

For more information regarding testing and requisition forms, refer to <http://www.bccdc.ca/PHSALaboratories>.

6.1.1 Virus Identification

The reverse transcriptase polymerase chain reaction (RT-PCR) assay is the test of choice for the definitive diagnosis of an acute mumps infection, but its sensitivity can be influenced by the following:

- timing of the specimen collection in relation to onset of illness;
- specimen integrity (rapid specimen processing).

If client presents at ≤ 5 days after symptom onset, collect oral specimen. If client presents at > 5 days after symptom onset, collect urine specimen. Buccal swab or saliva from the buccal cavity collected within the first 3 to 5 days of parotitis or symptom onset is the preferred specimen.

Oral specimen: These specimens are optimal for mumps virus detection and isolation purposes; in particular, buccal swabs or swabs of the area around Stensen's duct. If possible the parotid gland should be milked (stroke from angle of the jaw forward and down) and the specimen collected at the exit of the parotid duct (also known as Stensen's duct) which opens into the vestibule of the mouth opposite the upper 2nd molar tooth. Use a synthetic swab or a plain Dacron swab for collection of the specimen. Synthetic swabs are preferred over cotton swabs which may contain substances that are inhibitory to enzymes used in RT-PCR. Place swabs in standard viral transport media (VTM).

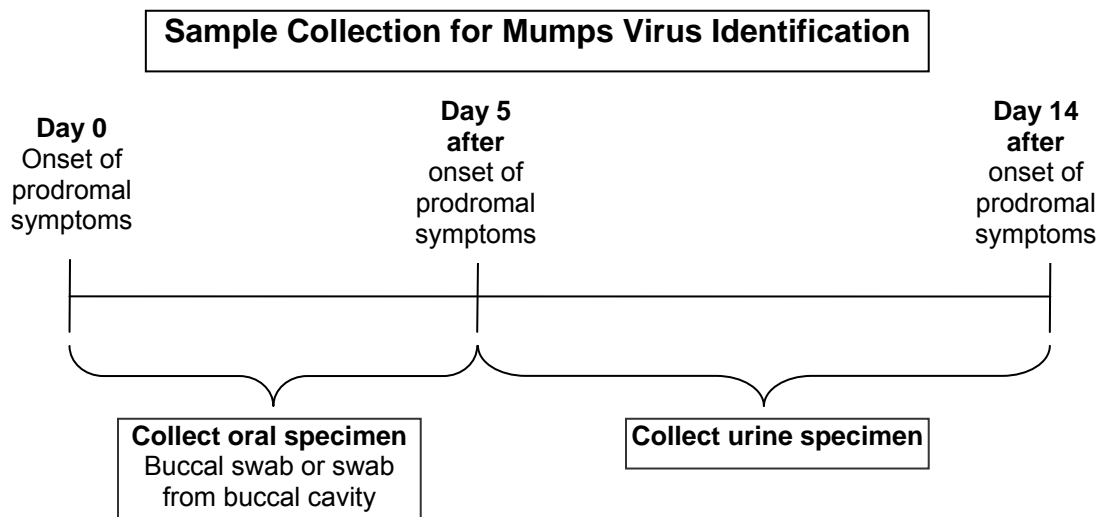
Collect oral specimen within 5 days of onset of symptoms.

In those who have not been previously immunized, the virus can be isolated from the saliva for up to 5 days after onset of symptoms, and from the urine for up to 2 weeks.

In previously vaccinated individuals, the virus may only be detected by RT-PCR within the first 3 days of presentation as it is cleared much more quickly than among those that are not immunized.

Urine specimen: mumps has been detected in urine by isolation in cell culture up to 14 days after the onset of prodromal symptoms. Limited data suggest that the virus may be detected in urine samples later (> 4 days post-onset) than oral specimens. Mumps outbreak experiences suggest that urine is not as sensitive as oral specimens. Nevertheless, in outbreaks of mumps, 7% of cases have been detected solely through testing the urine by RT-PCR.

Note: Keep samples refrigerated (~4°C) and ship as soon as possible to the BCCDC Public Health Microbiology & Reference Laboratory, under cold chain conditions.



6.1.2 Serology

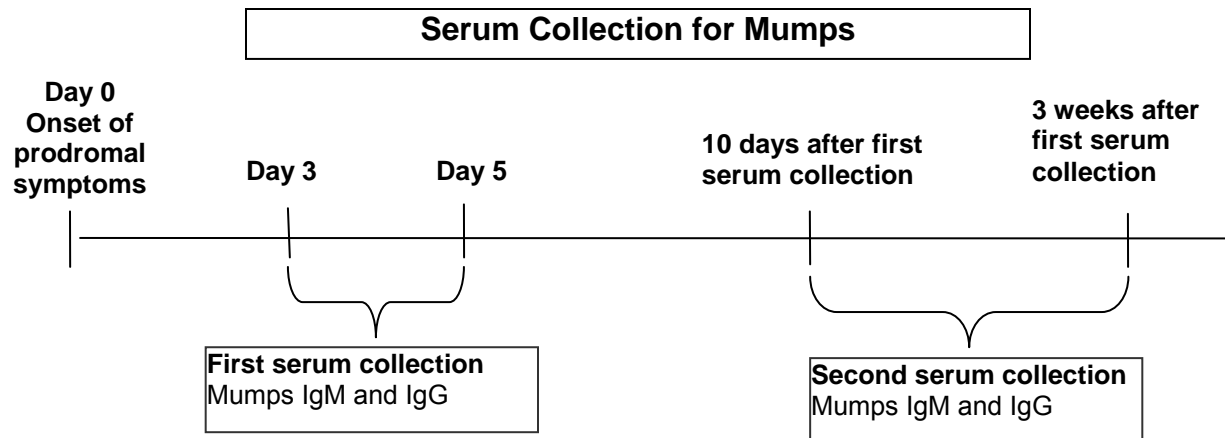
Collect both acute and convalescent serum specimens. The first (**acute**) serum sample should be collected as soon as possible upon suspicion of mumps and within 5 days after symptom onset. If mumps IgM class antibody is not detectable in a mumps-compatible case, the blood may have been drawn too early. Collect another sample for retesting. The second (**convalescent**) serum should ideally be collected at least 10 days and up to 3 weeks after the first sample.

In **unvaccinated** persons, the best time to collect serum is between 3 and 5 days from the onset of prodromal symptoms but specimens may be collected at the time of presentation. In unvaccinated cases, IgM antibody is present by day 5 post onset of prodromal symptoms and peaks after about 1 week.

If IgM class antibody is not detectable and the specimen was collected early in the illness, a second acute specimen should be obtained. IgM class antibody can be detected for at least 6 weeks.

Serology may be difficult to interpret in previously immunized people or those recently immunized against mumps. In previously **vaccinated** persons, the IgM antibody response to mumps infection is highly variable and may be absent. The existing IgG antibody will begin to rise soon after exposure and infection. At the time of onset of symptoms and collection of the acute serum, the IgG antibody may already be quite elevated, and may obscure the 4-fold rise typically observed between acute and convalescent serum specimens in previously unvaccinated individuals.

For persons with probable mumps, where laboratory confirmation is not available, discuss further course of action with the Medical Health Officer.



6.2 Interpretation of Test Results

For interpretation of serial acute / convalescent IgG results, call the BCCDC Public Health Microbiology & Reference Laboratory to obtain quantitative results of the enzyme immunoassay signal: [604-707-2627 from 8:30 – 4:30; 604-661-7033 (24 hours, 7 days per week)].

An increase of approximately 25% or more from the acute to convalescent value is deemed significant and indicative of a recent infection. This magnitude of increase is consistent with a four-fold or greater rise in IgG titres.



Mumps Testing Results	
Test Result	Interpretation
Positive PCR (oral swab or urine), regardless of serology result	Acute mumps infection.
Reactive IgM antibody	Possible acute mumps infection Note: Without additional confirmatory testing (i.e., IgG seroconversion or virus identification) this may be a false positive IgM result. Such cases should be reported as clinical/probable unless epidemiologically-linked to a laboratory confirmed case or outbreak related.
Non-reactive or equivocal IgM antibody	Not acute mumps infection (unless blood was drawn too early) in an unvaccinated person, but does not rule out mumps in a previously vaccinated person. Viral identification is required for confirmation in previously vaccinated people with this serological result.
Reactive IgG antibody	Immunity to mumps. However, this result is not definitive as vaccine-derived immunity may not confer complete protection. The presence of mumps-specific IgG, as determined using an enzyme immunoassay (EIA), does not necessarily predict the presence of neutralizing antibodies and, thus, immunity.
Non-reactive or equivocal IgG antibody	Not immune to mumps.

6.3 Case History

In order to properly interpret laboratory results, consider both clinical and epidemiologic information along with the laboratory information. Prior vaccination history, travel history, and timing of sample collection relative to disease onset are all factors that must be considered in the interpretation of lab results for the purpose of confirming mumps cases.

Determine **period of communicability** - maximum infectiousness occurs between 2 days before to 5 days following the onset of parotid swelling. However, virus has been isolated from saliva from 7 days before through 9 days after onset of swelling and may be detected in urine for up to 14 days after onset of swelling. Inapparent infections can be communicable.

Use the “Measles, Mumps, and Rubella Enhanced Surveillance Case Report Form” to collect data and determine if the case report meets the case definition for mumps.



See Section [12.0 Measles, Mumps, and Rubella Enhanced Surveillance Case Report Form](#). This form is available at: <http://www.bccdc.ca/cond/CDSurveillanceForms/default.htm#heading1>

If a suspect source of infection within BC is identified, investigate as another possible case.

6.4 Case Treatment

Clinical management of cases is outside the scope of this guideline. Public Health advice to confirmed and clinical cases of mumps should include the following: to practise good hand hygiene, avoid sharing drinking glasses or utensils, and cover coughs and sneezes with a tissue or forearm.

Cases in health care facilities should be managed with droplet precautions (in addition to routine practices) until at least 5 days after symptom onset and up to 9 days if symptomatic.

6.5 Exclusion of Cases

6.5.1 Exclusion of health care workers

Health care workers (HCWs) include and are not limited to: nurses; physicians; physiotherapists, lab technicians, HCW students; volunteers; medical office assistants; home care workers; emergency responders; and support staff in acute care, long-term care, home care, and community health settings.

Advise the case to immediately notify Occupational Health and/or Infection Control for the facility in which they work.

If the case is a HCW, the MHO should exclude them from work for at least 5 days after the onset of salivary gland swelling. This exclusion may be extended up to 9 days if the HCW remains symptomatic or if they work with vulnerable patients (e.g., immunocompromised). Those working with immunocompromised or other vulnerable patients may be reassigned to another area after day five, at the discretion of Occupational Health.

Clinical cases should be managed as confirmed cases until laboratory evidence suggests otherwise.

6.5.2 Exclusion from workplace, school, or child care settings

The MHO should exclude cases from school, daycare, post-secondary institution and the workplace for at least 5 days and up to 9 days (if symptomatic) after the onset of salivary gland swelling. The period of maximum communicability is from 2 days before to 5 days after onset of parotid swelling.

Advise cases to isolate themselves for a minimal period of 5 days after the onset of salivary gland swelling and to continue to avoid close contact (within 2 metres) with others wherever possible until 9 days after the onset of salivary gland swelling.

6.6 Case Travel

If the case travelled outside of BC during the infectious period, inform BCCDC and provide case's itinerary so that other public health authorities may be notified.

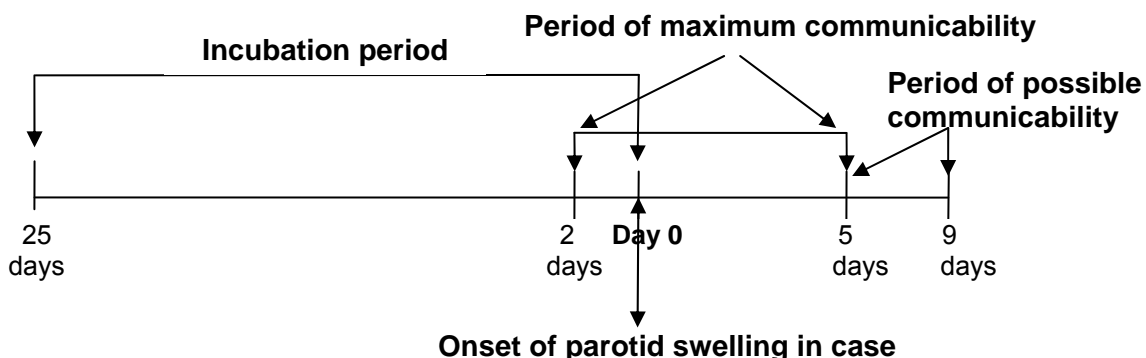
7.0 CONTACT MANAGEMENT

7.1 Contact Identification

Identify contacts. Contacts include those with the type of contact listed below with the case during the period of maximum communicability (i.e., during the 2 days prior to the onset of parotid swelling to 5 days after onset of parotid swelling). This represents the period of maximum communicability. Virus has been isolated from saliva from 7 days before through 9 days after onset of parotid swelling.

- household contacts;
- persons who share sleeping arrangements with the case, including shared rooms;
- direct contact with the oral/nasal secretions of an infectious case (e.g., close contact within a distance of 2 metres; sharing cigarettes, drinking glasses, food, cosmetics like lip gloss; kissing on the mouth);
- children and staff in child care and school facilities (as deemed necessary by the epidemiology of the outbreak).

The [Measles, Mumps, and Rubella Enhanced Surveillance Case Report Form \(Section 12.0\)](#) may be used for data collection.





7.2 Assess susceptibility of contacts

Assess whether each identified contact is susceptible or immune to mumps. Those not immune are considered susceptible.

The following contacts are considered **immune** to mumps (i.e., **not susceptible**):

- have had a clinical diagnosis of acute mumps **and** laboratory confirmation of same; **or**
- born on or after January 1, 1970 with documented evidence of two doses of mumps-containing vaccine on or after the first birthday and given at least 4 weeks apart; **or**
- born between January 1, 1957 and December 31, 1969 with documented evidence of one dose of mumps-containing vaccine on or after the first birthday; **or**
- born before 1957.

Given there is no known serologic threshold that correlates with immunity to mumps, mumps serology is not to be used for assessment of immunity. The only exception is post-exposure serology when no other information is available and a health care worker may need to be excluded.

Determine whether any of the identified contacts are health care workers (HCWs). If a contact is a susceptible HCW, advise that individual to notify Occupational Health and/or Infection Control for the facility in which the HCW works.

Investigate the possibility of additional suspect cases among the contacts.

7.3 Immunoprophylaxis of Susceptible Contacts

Offer MMR vaccine to susceptible contacts who do not have a contraindication to the vaccine. Although mumps immunization after exposure to mumps may not prevent the disease, it is not harmful. Should the exposure not result in an infection, the vaccine will confer protection against future exposures. There is no evidence that the risk of vaccine-associated adverse events increases if vaccine is administered to persons incubating mumps disease.

Testing for antibody to mumps virus to identify susceptible individuals prior to immunizing should not be done because a serological correlate of protection has not been established. The presence of pre-existing anti-mumps antibody is not a contraindication to mumps immunization.



On rare occasions, mumps vaccine can cause parotitis which may be clinically indistinguishable from mumps infection. Parotitis associated with mumps vaccine most commonly occurs within 10 to 14 days of immunization. Virus isolation and typing will distinguish wild from vaccine strain virus.

The serologic response to vaccine is indistinguishable from wild type infection because IgM can be elevated by vaccine or infection. In contacts that have received mumps vaccine post-exposure and develop symptoms of mumps, specimens must be collected for virus identification to confirm the diagnosis of mumps as serology will not be helpful.

Immune globulin is not recommended for mumps for post exposure prophylaxis.

7.4 Exclusion of Susceptible Contacts

7.4.1 Health care settings

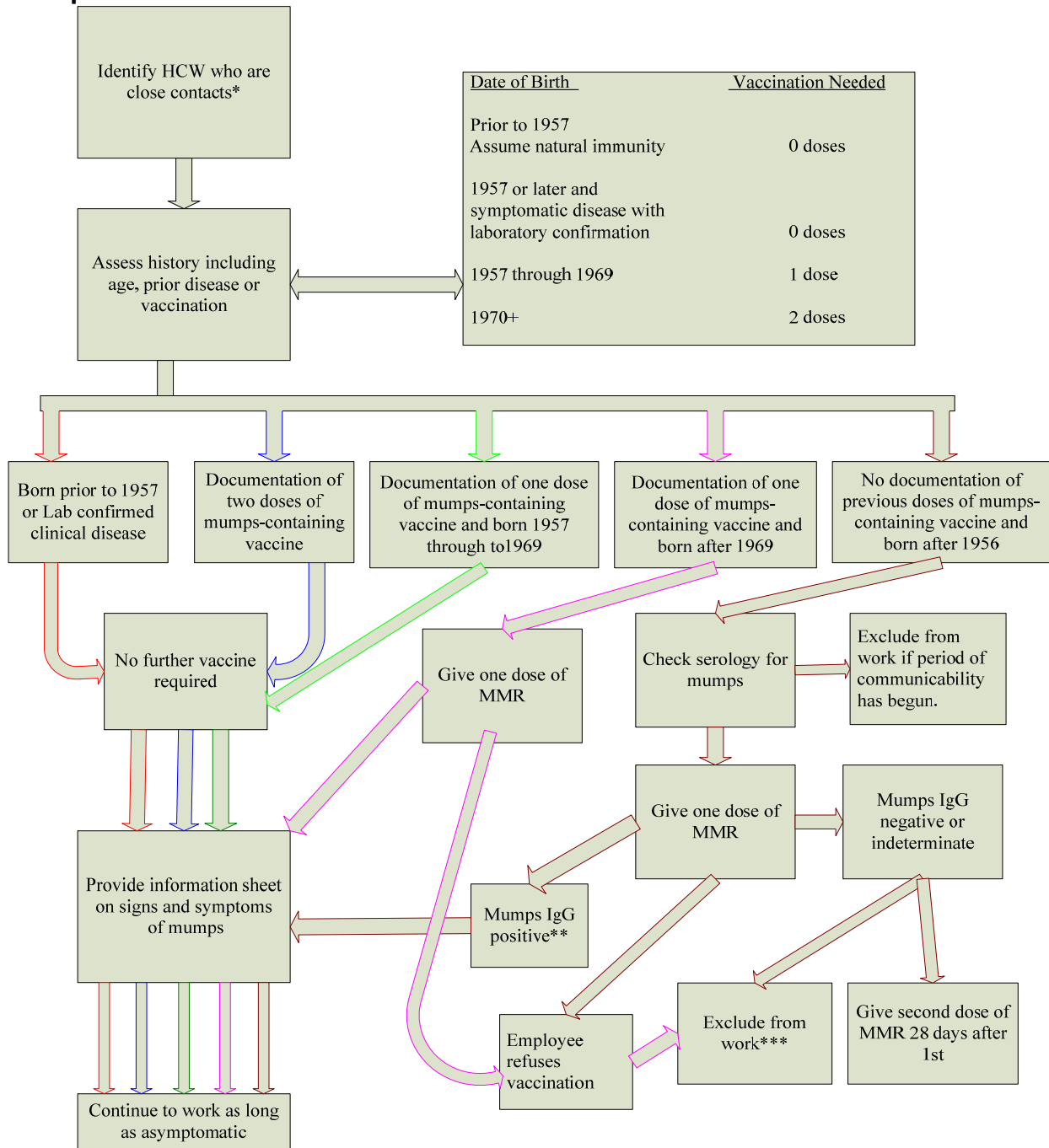
When a susceptible HCW is exposed to a case of mumps, a risk assessment must be made to determine whether the HCW may return to work. Best practice is to exclude the HCW from any work in the health care setting from the 10th day after the first exposure until the 26th day (inclusive) after the last exposure to the case of mumps. These time intervals reflect the range of the incubation period and the potential period of communicability before the possible onset of symptoms.

Refer to [Figure 1: Management of health-care workers who are close contacts of a case of mumps](#). This figure was taken from the Occupational Health and Mumps Vaccine Expert Working Group “Recommendations for Baseline Assessment and Management of Health Care Workers (HCW) who are Cases or Contacts of Mumps.”

7.4.2 Workplace, school, or child care settings

Exclusion of susceptible contacts to a mumps case is **not** indicated.

Figure 1: Management of health-care workers who are close contacts of a case of mumps



*Close contact (exposure) for health care workers is defined as providing patient care with unprotected close contact within two metres of a confirmed case during the period of maximal communicability (2 days before and 5 days after onset of classical signs and symptoms).
 **Will need a second dose of MMR if born after 1969.
 ***Contacts should be excluded from day 10 after the first contact with the case through day 26 after the last contact with the case (where day of exposure is day 1).



7.5 Contact Education

Advise susceptible contacts:

- about the signs and symptoms of mumps, how it is transmitted, and to isolate themselves at home immediately if any symptoms of mumps develop until an assessment has been done to confirm a diagnosis of mumps;
- to observe for signs and symptoms of mumps beginning 10 to 25 days after the first contact with a case;
- to rapidly report any symptoms compatible with mumps to their doctor/health care provider. Advise them to call ahead before going to any health care facility, including laboratories, to inform the staff of mumps symptoms so that they can be isolated on arrival to avoid exposing any susceptible persons.
- to inform their local public health unit should they develop mumps.

8.0 REPORTING

Complete the individual case report in iPHIS (Integrated Public Health Information System) or PARIS within 7 business days following identification of a suspect, clinical/probable, or confirmed case of mumps.

Fax the completed Measles, Mumps and Rubella Enhanced Surveillance Case Report Form to Epidemiology Services, BC Centre for Disease Control (fax: 604-707-2516). See Section [12.0 Measles, Mumps, and Rubella Enhanced Surveillance Case Report Form](#). This form is available at <http://www.bccdc.ca/dis-cond/CDSurveillanceForms/default.htm>.

Update iPHIS/PARIS if more or new information becomes available. Update the case status item if the case changes from case status based on results of data collection or laboratory test results.

The BCCDC may notify other Canadian jurisdictions about the occurrence of an outbreak of mumps via the Canadian Network for Public Health Intelligence (CNPHI).

9.0 OUTBREAK MANAGEMENT

A mumps outbreak is defined as confirmed cases in excess of what is expected in the jurisdiction over a given period of time.

The public health response to increased mumps activity includes managing cases, identifying and managing contacts, and identifying social networks, when individual follow-up is not feasible, and maintaining/enhancing surveillance for further cases and disease outcomes.



Generally, a mumps outbreak is managed by the following methods:

- defining the at-risk populations and transmission settings;
- preventing further transmission through isolation of cases and contact education/awareness;
- protecting susceptible populations with immunization (where no contraindication to MMR vaccine exists); and
- good risk communication.

9.1 Intensify Surveillance

Conduct enhanced surveillance for additional cases of mumps including through notification of local physicians about the occurrence of mumps in the area and diagnostic testing.

Consult BCCDC Immunization Programs and Vaccine Preventable Diseases Service (IP-VPD Service) about assistance with an outbreak investigation or other control strategies. Collect the case information required for reporting of cases. Plot an epidemic curve. Collect enough specimens to confirm the existence of an outbreak, and continue to collect sufficient specimens from each generation of cases to establish that mumps is the cause of illness, especially if non-specific symptoms predominate. Describe the outbreak in terms of person (including age and immunization history), place, and time. Mapping cases by place of residence or work over time can be useful in delineating the population at risk and appropriate choice of denominator for rate calculations and settings for vaccination clinics.

9.2 Immunization

Notify IP-VPD Service of the outbreak and provide an estimate of the number of excess doses of vaccine required if expanded immunization services are being planned. IP-VPD Service will request BCCDC Pharmacy to arrange additional vaccine purchasing, if required.

Outbreaks that are limited to family or closely related groups in which the cases can be epidemiologically linked can be managed with a limited offering of vaccine.

Outbreaks that are community based with multiple generations of cases occurring in a geographic area and without epidemiologic links require broader messaging and offering of immunization.

There is no threshold of numbers of cases or rates above which expansion of control measures should be done (e.g., broader offering of vaccine). These measures will need to be considered on a situation specific basis. The characteristics of cases of mumps and the settings in which transmission is occurring should guide the focus of vaccination



activity. Anyone who is not up to date on their immunization and resides within the outbreak area should be offered the vaccine as this is an opportunity to update their immunization status.

Immunization is not known to prevent mumps in those already exposed, but will protect against future exposures if given sufficiently in advance of that exposure (i.e., minimum 14 days) and will eventually interrupt the outbreak if it results in sufficient herd immunity.

Provide immunization clinics in locations readily accessible by the affected community including in high schools, on campuses, and in other appropriate community based settings (e.g., churches, large workplaces with several cases of mumps).

9.3 Communication

Public Health should notify the local hospitals and physicians about the outbreak at its start. This is to ensure diagnosis and reporting of cases but also to ensure health care worker immunization and infection control policies are fully implemented.

During a community outbreak, notify local physicians, hospitals, and post-secondary institutions about the outbreak and mumps immunization recommendations. Inform the public through use of local media, press releases, and radio and newspaper press conferences. Additional promotion using flyers and posters should be done in targeted (e.g., affected) settings such as colleges/ universities.

9.3.1 Contact notification

Contact notification should be done by public health if resources permit, but resources may not be sufficient to do this with a large number of cases. An alternative is contact notification by the case. Contacts should be informed by the case about their potential exposure and asked to do the following:

- review their immunization history for evidence of MMR vaccine receipt and get immunized if needed. Refer them to the MMR Vaccine HealthLink BC File #14a available at <http://www.healthlinkbc.ca/healthfiles/hfile14a.stm>;
- watch for signs and symptoms of mumps. Refer them to the Mumps HealthLink BC File #14c available at <http://www.healthlinkbc.ca/healthfiles/hfile14c.stm>;
- contact local public health authorities should symptoms occur;
- isolate themselves if symptomatic until a clinical assessment has been done to confirm mumps diagnosis.

Depending on the epidemiology of the outbreak, alternative follow-up mechanisms (e.g., letter, web based and emailed messages, public service announcement, press release, toll-free telephone number) should be considered to reach contacts and provide information to other at-risk groups.



9.3.2 Mass gatherings

Gatherings at which mumps can be transmitted include events of all sizes, in both private and public settings. Gatherings may include social or religious functions, sports activities, shopping events, concerts, conferences, meetings as well as public transit. During an outbreak, events need not be cancelled.

Jurisdictions may consider postponing gatherings that pose a high-risk for transmission or involve unimmunized populations. In the context of a mumps outbreak, public health and event organizers should advise participants:

- of the potential for exposure and measures to take to reduce risk of spreading the disease (e.g., check that immunization is up-to-date, hand hygiene, avoid sharing food/drink/utensils, cough or sneeze into crook of elbow, stay home if ill);
- about mumps symptoms and prevention;
- that if they become ill, to call ahead before visiting their health-care provider.

Refer individuals to HealthLink BC for more information:

- Phone 8-1-1; Website: <http://www.healthlinkbc.ca/kbaltindex.asp>

9.4 Analyze the Outbreak

Review the effectiveness of the local control measures and revise local protocols as necessary.

An epidemiological analysis of events of the outbreak provides a useful local reference.

9.5 Health Care Workers

The following are recommended for management of health care workers in settings where mumps cases are being assessed in the context of a **community-based outbreak**:

- Identify areas of the facility (e.g., parts of the hospital) where exposures are likely to occur, such as the emergency room and laboratory areas;
- Review immunization records of HCWs employed in these areas;
- Update immunization status as per BC guidelines for health care workers available at: <http://www.bccdc.ca/dis-cond/comm-manual/CDManualChap2.htm>
See Section III, Immunization of Special Populations.
- For more information, refer to the Occupational Health and Mumps Vaccine Expert Working Group “Recommendations for Baseline Assessment and Management of Health Care Workers (HCW) who are Cases or Contacts of Mumps” available at http://www.picnetbc.ca/sites/picnetbc2/files/PICNet_Publications/OH_Mumps_Expert_Group_Recommendations_July29.09.pdf



Advise health-care workers to immediately notify Occupational Health and/or Infection Control for their facility should they develop symptoms of mumps.

10.0 CLINICAL DESCRIPTION

Mumps is an acute infectious disease caused by the mumps virus. It is characterized by swelling of one or more of the salivary glands, most commonly the parotid glands (parotitis), which may be unilateral but is more commonly bilateral. Sometimes the sublingual or submaxillary glands are involved.

Parotitis may be preceded by a non-specific prodrome lasting 3 to 5 days with fever, headache, malaise, myalgia, and anorexia. About 20-30% of those infected develop acute parotitis. Non-specific or primarily respiratory symptoms occur in about half of those who acquire infection and in children under 5 years old mumps can present as a primarily lower respiratory infection. Fever lasts 1-6 days but enlargement of the parotids may persist 10 days or longer.

While mumps virus is the major etiologic agent of parotitis, this condition can also be caused by other viruses such as Coxsackie, influenza A, parainfluenza and Epstein Barr virus, as well as bacteria such as streptococci and staphylococci.

Up to 30% of mumps infections are sub-clinical. Although complications are relatively frequent, permanent sequelae are rare. Before the widespread use of mumps vaccine, mumps was a major cause of viral meningitis. Mumps meningoencephalitis can, rarely, result in permanent neurologic sequelae, including paralysis, cranial nerve palsies, and hydrocephalus. Transient but occasionally permanent deafness may occur at an estimated rate of 0.5 to 5.0 per 100,000 reported mumps cases. Orchitis occurs in 20% to 30% of post-pubertal male cases, mastitis in up to 31% and oophoritis in 5% of post-pubertal female cases. Involvement of the reproductive organs is commonly unilateral; therefore, sterility as a result of mumps is rare. Neither wild type infection nor vaccination provides a lifelong guarantee of immunity.

Mumps infection during the first trimester of pregnancy may increase the rate of spontaneous abortion, but mumps infection in pregnancy has not been associated with congenital malformations.

11.0 EPIDEMIOLOGY

Mumps incidence in BC has declined dramatically since 1997, when an outbreak in young people occurred, bringing the number of cases to 131. Mumps control has likely benefited from two changes to the MMR vaccine recommendations, implemented in 1996: the two dose MMR vaccine schedule for young children and a recommendation for a 2nd dose of MMR vaccine for college and university students and health care workers.



From 2002 through 2006, fewer than 10 cases were reported each year, mainly in adults.

For the year 2007, a total of 27 cases were reported in BC, with a median age of 28 years and including 2 clinical cases. 70% of the cases were in the age group 15-29 years. Three of the cases had known links to the mumps outbreak in the Maritimes. Some clustering of cases occurred in the August / September period with a small number of transmission cycles.

There were 192 cases of mumps reported in BC in 2008. Eighty five were laboratory confirmed, 44 epidemiologically linked, 32 clinical, and 19 suspect cases. Most cases (n=180) were associated with an outbreak of mumps in the Fraser Health Region that occurred from February to September. Enhanced surveillance of outbreak-related cases was conducted to allow for recording of cases and variables not usually reported through iPHIS (Public Health Information System). Four cases occurred among residents of other areas of the province that were related to travel/exposure to the outbreak affected area. The outbreak clustered around a religious vaccine resistant community in Fraser East. Cases in this community were underreported and it is likely that many more cases occurred. Nearly half of all reported cases were unimmunized (47%). The majority of cases were male (57%) and in this community the outbreak began in and primarily affected a young school aged population (48% aged 0-19 years; range: 0-54). Complications were reported in approximately 16% of cases and were mainly orchitis; one case of mumps meningitis was confirmed. No deaths were reported.

Twelve sporadic cases of laboratory confirmed mumps occurred in the province unrelated to the outbreak. Of these, 6 (50%) were related to travel to an area of known mumps activity outside of BC, 5 cases had unknown exposure and 1 case had a known link to another sporadic case.

As a result of the outbreak, immunization policy in BC changed to include a recommendation for two doses of mumps-containing vaccine for individuals born on or after January 1, 1970.

There were 25 confirmed cases of mumps reported in BC in 2009 and six in 2010.

In mumps outbreaks in recent years in other Canadian provinces and in Fraser Health in 2008, the provision of vaccine to susceptible groups (as defined by the particular epidemiology of the outbreak) has resulted in low levels of vaccine uptake. Two patterns of outbreaks have been seen in Canada: a) among communities unimmunized due to religious reasons; these have affected mainly school age children; 2) among young adults, with the majority of cases among people in their 20s and other cases among those born after 1969 with small numbers among older individuals.



In 2008 BC added a 2nd dose of mumps to its immunization schedule recommendations for people born after 1969 but the strategy for its implementation has been through opportunistic health encounters rather than mass catch-up. Therefore, the two patterns described above are likely to continue to predominate.

11.1 Mumps Immunization in BC

Mumps vaccine was approved in Canada in 1969, and MMR vaccine was approved in 1972. MMR vaccine began to be used in the publicly funded immunization program in 1981 in BC for children aged 12 months, preschoolers, and susceptible school children. In 1985, an MMR campaign was conducted over a 1 to 2 year period by health authorities for school children in grades K to 12, with immunizations given by public health nurses in the schools. In 1996, BC conducted a measles elimination campaign targeting children aged 19 months of age through to those attending post-secondary (college/ university) educational institutions. This campaign utilized measles-rubella (MR) vaccine, and did not deliver a second dose of mumps vaccine. In the same year, a policy of second dose of MMR vaccine at 18 months of age was recommended for measles elimination in addition to the first dose given at 12 months of age.

In 1996, BCCDC immunization guidelines also recommended a second dose of measles vaccine given as MMR vaccine to health care workers born after 1956 and to students of colleges and universities; vaccine for these groups became publicly funded in 2006 and 2007, respectively. While intended for measles elimination, these policies have had the potential to deliver a second dose of mumps vaccine to a large proportion of health care workers. Data on health care worker coverage are not available at the provincial level.

Immunization coverage rates are assessed using iPHIS for children in 14 of the 16 BC health service delivery areas. For the 2008 birth cohort, 87% of children had received 1 dose of mumps vaccine by their second birthday and 74% had received two doses by their second birthday (data extracted from iPHIS January 17, 2011). For the school years ending June 30, 2009 and 2010 respectively, 92.1% and 88.4% of kindergarten children had a record of receiving two doses of mumps vaccine.

In 2011, 13 years after implementation of a measles 2-dose policy, most children aged about 17 years old and younger who have lived their lives in BC will have received two doses of mumps vaccine given as MMR vaccine, and those up to about 41 years of age will have been offered one dose of MMR vaccine. Those older than 41 are likely to have naturally acquired immunity as mumps continued to circulate prior to and during the first several years of immunization programs in Canada but a dose of MMR vaccine for mumps protection may be offered to those born after 1956.



The following table summarizes the number of doses of MMR vaccine recommended for BC residents based on its constituent components:

Date of birth	Measles	Mumps	Rubella❶	MMR vaccine❶
Prior to 1957	0 doses	0 doses	0 doses	0 doses
1957 – 1969	2 doses	1 dose	1 dose	2 doses
1970+	2 doses	2 doses	1 dose	2 doses

❶ One dose of MMR vaccine for rubella protection is recommended for all Health care Workers regardless of age.

12.0 MEASLES, MUMPS, AND RUBELLA ENHANCED SURVEILLANCE CASE REPORT FORM

Fax the completed “Measles, Mumps and Rubella Enhanced Surveillance Case Report Form” to Epidemiology, BCCDC within 7 days of receipt of report (fax: 604 707-2516). The form is available at <http://www.bccdc.ca/dis-cond/CDSurveillanceForms/default.htm>

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