

4.1 Diseases Preventable by Routine Vaccination

This section includes the procedure required in order to complete investigation, control and reporting measures for diseases that are vaccine preventable and on the notifiable disease list for Newfoundland and Labrador. The disease may be respiratory (e.g. influenza) and is covered here as it is primarily a disease preventable by routine immunization. The diseases discussed in this section are covered by publicly funded immunization programs for targeted groups in Newfoundland and Labrador.

For each of these diseases, immediate recognition and control measures are vital to containment. Vaccine Preventable Diseases should be rare when the immunization programs are effective.

The follow-up varies with each disease, dependant upon several disease-specific factors. The following are general guidelines and further description is provided in the specific disease section.

General procedure

- Confirm the diagnosis, and confirm whether or not the case has been informed and treated. If confirmation is delayed request immediate notification of test results from the laboratory
- Obtain required demographic information in relation to the case and the attending physician
- Contact the case to determine if this individual is in a situation where there is a high risk of transmission of the illness (childcare, health care worker etc.)
- Investigate the most probable source of infection which should include:
 - recent exposure to someone else who is sick with similar symptoms
 - travel history
 - attendance in childcare, school, daycare, healthcare settings
- Conduct contact tracing to determine if any contacts are from a high risk group
- Conduct contact tracing to inform contacts of any prophylaxis, vaccine and/or exclusion measures
- If an outbreak is identified an outbreak team is formed to complete the investigation and follow-up required
- Educate case and contacts regarding the disease
- Complete case detail investigation forms
- Report as per List A, B, C

Publicly funded treatment (antibiotics or antivirals) is indicated for many of the vaccine preventable diseases and is addressed in the specific disease section.

Diphtheria

List A

All confirmed and probable cases are notifiable provincially. Only confirmed cases of disease should be notified nationally.

Case Definition

Confirmed Case

Clinical illness or systemic manifestations compatible with diphtheria in a person with an upper respiratory tract infection*, or at another site (e.g. wound, cutaneous) PLUS at least one of the following:

Laboratory confirmation of infection:

- isolation of *Corynebacterium diphtheriae* from an appropriate clinical specimen
- OR
- isolation of other *Corynebacterium* species from an appropriate specimen
- OR
- histopathologic diagnosis of diphtheria
- OR
- epidemiologic link (contact within 2 weeks prior to an onset of symptoms) to a laboratory-confirmed case

Probable Case

- Clinical illness* in the absence of laboratory confirmation or epidemiologic link to a laboratory-confirmed case

Suspected Case

- Upper respiratory tract infection (nasopharyngitis, laryngitis, or tonsillitis) with a nasal, tonsillar, pharyngeal and/or laryngeal membrane (NB the membrane must be present)

*Clinical evidence

- upper respiratory tract infection (nasopharyngitis, laryngitis, or tonsillitis) with or without an adherent nasal, tonsillar, pharyngeal and/or laryngeal membrane, plus at least one of the following:
 - gradually increasing stridor
 - cardiac (myocarditis) and or neurologic involvement (motor and/or sensory palsies) 1-6 weeks after onset
 - death, with no known cause

Clinical Presentation

Diphtheria presents with a loss of appetite, fever that is rarely over 38.5°C, and grey patches of pus seen on the throat causing severe pain. There is marked weakness with swelling of the lymph glands in the neck that is very tender. After one week the symptoms gradually disappear. Complications from the disease include damage to the throat after the membrane extends down the larynx causing hoarseness, noisy breathing and may block off the larynx resulting in death by suffocation.

The fatality rate is about 10%. Other severe complications from diphtheria include heart failure; if enough toxin is absorbed into the body it can damage the heart muscle. Nerve damage can occur that results in a loss of control of muscles and, a temporary but slow to resolve paralysis. If the toxin damages the kidneys it can lead to kidney failure.

Epidemiology

Occurrence: Worldwide diphtheria outbreaks have occurred in the former Soviet Union when an interruption of the immunization program took place. Russia and the Ukraine had epidemics during the early 1990's. Many of those affected were over the age of 15 years. This emphasizes the need to maintain immunization programs to prevent the re-emergence of this disease that is now rarely seen in Canada. In Canada there were outbreaks seen during the 1920's. Routine immunization programs introduced in the 1930's were successful in preventing further outbreaks. In recent years there have been very few cases in Canada with none reported since 2000, and a total of 12 cases seen since 1991.

Reservoir: Infected individuals who may be symptomatic or asymptomatic.

Transmission: The organism, *Corynebacterium diphtheriae*, may be present in the nasopharynx, skin and other sites of asymptomatic carriers which make it difficult to eradicate. It can be transmitted through nasopharyngeal secretions through droplet spread or, from infected individual with skin lesions or contact with articles that have been contaminated with discharge from these lesions.

Incubation Period: The incubation period for diphtheria is about 2-5 days but may be longer.

Period of Communicability: The period of communicability is variable. It is usually from less than 2 weeks and rarely more than 4 weeks. The infectious period lasts until the virulent bacilli are no longer present in the discharges and lesions. Antibiotic treatment is effective in termination of the shedding. The rare chronic carrier may shed organisms for 6 months or more.

Diagnosis: Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case: If there is a strong suspicion of diphtheria then treatment with diphtheria antitoxin should be started, accessed through the Department of Health and Community Services. The antitoxin blocks or neutralizes the effects of the toxin. Early treatment prevents damage to the heart and lowers the death rate to 5% compared to 15-20% with late treatment.

Antibiotics such as penicillin and erythromycin shorten the period of communicability. For other treatment options see Control of Communicable Diseases Manual, most recent edition. Immunity does not occur after an infection so a primary immunization series plus a booster should be given. Droplet precautions should be taken to prevent further spread. For those who develop cutaneous diphtheria contact precautions must also occur. Isolation should be continued until seven cultures taken 24 hours apart and at least 24 hours after cessation of the antibiotics are negative.

Management of Contacts: All contacts should have swabs for culture taken from the nose and throat and should be kept under surveillance for 7 days. A single dose of benzathine penicillin G (IM) is recommended (600,000units for persons under 6 years 1.2 million units for 6 years or older). Efforts must be made to identify the source of infection. Those who work with food service, childcare, school or settings involving the elderly should be excluded from work until cultures prove they are not carriers.

Those who were immunized in the past should be boosted if more than 5 yrs have elapsed since their last dose. Those who were not immunized should have their schedules started according to Canadian Immunization Guide.

Management of Outbreaks: Immunization is the best way to curb an outbreak especially for infants and small children. Identify high risk groups or those at greatest risk and provide immunization.

Preventive Measures

The most effective preventive measure against diphtheria is educating the public about maintaining high immunization rates to prevent this disease. Children in Canada and other developed countries receive protection from vaccinations, given as part of the routine immunization program. Booster doses of diphtheria vaccine should be given every 10 years to maintain protective antibody levels.

Individuals who are carriers should be given education regarding good personal hygiene. That should include good hand washing especially after contact with contaminated secretions or lesions, placing contaminated tissues in the garbage, cleaning skin lesions, and keeping all infected wounds covered.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the regional medical officer of health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list A
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the CDR

Diphtheria antitoxin is accessed through the Department of Health and Community Services (DH&CS) by calling **729-3430** or the MOH after hours **1-866-270-7437**.

Haemophilus influenzae, serotype b, invasive disease **List A**

All confirmed and probable cases are notifiable provincially. Only confirmed cases of disease should be notified nationally.

Case Definition**Confirmed Case**

Clinical evidence of invasive disease¹ with laboratory confirmation of infection:

- isolation of *H. influenzae* (serotype b) from a normally sterile site
- OR
- isolation of *H. influenzae* (serotype b) from the epiglottis in a person with epiglottitis

Probable Case

Clinical evidence of invasive disease¹ with laboratory evidence of infection:

- demonstration of *H. influenzae* type b antigen in cerebrospinal fluid
- OR
- demonstration of *H. influenzae* DNA in a normally sterile site
- OR
- Buccal cellulitis or epiglottitis in a child < 5 years of age with no other causative organisms isolated

¹Clinical illness associated with invasive disease due to *H. influenzae* includes meningitis, bacteraemia, epiglottitis, pneumonia, pericarditis, septic arthritis and empyema.

Clinical Presentation

Haemophilus influenzae serotype b (Hib) can cause pneumonia, bacteraemia, meningitis, epiglottitis, septic arthritis, cellulitis, otitis media and purulent pericarditis. The onset of symptoms is usually sudden with development of symptoms associated with the disease presentation; for example, with Hib meningitis symptoms may include fever, vomiting, lethargy, headache and stiff neck.

Epidemiology

Occurrence: World wide *Haemophilus influenzae* type b (Hib) disease is estimated to cause 3 million cases of meningitis and severe pneumonia and approximately 386,000 deaths worldwide per year in children aged <5 years. In developed countries the incidence of Hib disease has dramatically declined since the introduction of the Hib conjugate vaccine in 1988. In Canada the incidence rate has declined from 1.9 per 100,000 in 1989 to 0.2 per 100,000 in 2004. In Newfoundland Labrador there has been one case of Hib reported from 1998-2008.

Reservoir: The natural habitat of the organism is the upper respiratory tract of humans.

Transmission: The mode of transmission is person-to-person by inhalation of respiratory droplets or by direct contact with respiratory tract secretions.

Incubation Period: The incubation period is unknown but believed to be short, 2 – 4 days.

Communicability: It is felt to be communicable seven days prior to the onset of symptoms until the case has been on effective antibiotic therapy for 24 hours.

Diagnosis: Clinical signs and symptoms must be confirmed by laboratory findings.

Control Measures

Management of Case: Supportive care and prompt treatment with an antibiotic is required. Initial therapy for children is usually cefotaxime or ceftriaxone. Droplet precautions are recommended until the case has had 24 hours of effective antibiotic therapy.

Management of Contacts: Careful observation of exposed unimmunized or incompletely immunized children who are household, child care, or nursery contacts of patients with invasive Hib disease.

Chemoprophylaxis is recommended for the following:

- Household contacts – defined as people residing with the index case or non-household contacts who spent four or more hours with the index case for at least 5 days prior to the onset of illness AND:
 - Household with one contact younger than 4 years of age who is unimmunized or incompletely immunized
 - Household with a child younger than 12 months of age who has not received the primary series
 - Household with a contact who is an immunocompromised child, regardless of that child's Hib immunization status
- Nursery school and child care center contacts – Chemoprophylaxis is only recommended when 2 or more cases of Hib invasive disease have occurred within 60 days
- Index case – If younger than 2 years of age or member of a household with a susceptible contact and treated with a regimen other than cefotaxime or ceftriaxone
- When the decision is made to give chemoprophylaxis to contacts, it must be provided to all persons in that setting regardless of age or immunization status.

Chemoprophylaxis – Rifampin eradicates Hib from the pharynx in approximately 95% of carriers and decreases the risk of secondary invasive illness in exposed household contacts. Rifampin is given once per day for four days. Rifampin is available from the provincial vaccine depot and is given to contacts of Hib diseases at no charge.

Immunoprophylaxis – In addition to chemoprophylaxis, unimmunized or incompletely immunized children should receive a dose of vaccine and should be scheduled for completion of the recommended age-specific immunization schedule.

Management of Outbreaks: An outbreak management team should be established to address infection prevention and control measures.

Preventive Measures

The early prevention of Hib disease through immunization remains the first line of defense against the disease and its circulation. Despite limited efficacy data, Hib vaccination is commonly given to those with anatomic or functional asplenia and may be considered in other immunocompromised persons at increased risk of invasive Hib infection. Individuals with cochlear implants are also considered at high risk of invasive Hib disease and should be immunized. Children who develop Hib disease after immunization with Hib vaccine should have an immunologic assessment. A fact sheet on Hib disease is available at: <http://www.phac-aspc.gc.ca/im/vpd-mev/hib-eng.php>

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report probable or confirmed cases to the regional medical officer of health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list A
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Hepatitis B

List B

Only confirmed cases are reported.

Case Definition

Confirmed case

Hepatitis B surface antigen (HBsAg) and immunoglobulin M antibody to hepatitis B core antigen (anti-HBcIgM) positive in the context of a compatible clinical history or probable exposure

OR

- Clearance of HBsAg in a person who was documented to be HBsAg positive within the last six months in the context of a compatible clinical history or probable exposure

Probable case

- Acute clinical illness in a person who is epidemiologically linked to a confirmed case

Chronic carrier confirmed case

- HBsAg positive for more than 6 months

OR

- Detection of HBsAg in the documented absence of anti-HBc-IgM

OR

- Detection of HBV DNA for more than 6 months

Unspecified confirmed case

- Does not fit the criteria for either of the above

AND

- HBsAg positive

OR

- Detection of HBV DNA

Clinical Presentation

Hepatitis B virus (HBV) causes a wide spectrum of manifestations ranging from asymptomatic seroconversion, sub-acute illness with non-specific symptoms (e.g. anorexia, nausea, or malaise) or extrahepatic symptoms, and clinical hepatitis with jaundice, to fulminant fatal hepatitis. Only 10% of children and 50% of adults will exhibit symptoms. An acute illness may last up to three months with a fatality of 1-2%. In most acute cases HBsAg serum levels are positive initially, resolve and the individual develops anti-HBs which confers immunity.

Chronic HBV infection is found in 0.5 % of adults in North America. After acute HBV infection, the risk of developing chronic infection varies with age, infants infected at birth have a 90% chance of becoming a chronic carrier. A chronic carrier is one who retains HBsAg positivity six months after the initial infection. These individuals are always infectious. Hepatocellular carcinoma and hepatic cirrhosis is likely to result in the premature death of 15-25% of those who have chronic HBV.

Epidemiology

Occurrence: Worldwide, endemic in some Asian countries. In Canada the incidence of acute hepatitis B is estimated to be 2.3 per 100,000. In developed countries exposure to HBV may be common in certain high-risk groups such as injection drug users, person who have multiple sex partners, men who have sex with men, sex with HBV-infected

persons and having a hepatitis B carrier in the family. The prevalence of chronic hepatitis B varies in different populations. In NL chronic cases are the most common type identified with acute cases rarely identified.

Reservoir: Humans

Transmission: Mode of transmission is via blood and body fluids. Common routes include: percutaneous, vaginal, anal and oral sex, sharing and using non-sterilized needles, horizontal - close household contacts, vertical mother to neonate.

Incubation Period: The incubation period is usually 45-180 days with an average of 60-90 days.

Period of Communicability: All persons who are HBsAg-positive are potentially infectious.

Diagnosis: Diagnosis is based on findings consistent with the case definition listed above.

Control Measures

Management of Cases: Persons infected with hepatitis B must be notified of their illness to ensure they receive the required follow-up. There is no specific treatment for acute hepatitis B infection. Any patient known to have chronic hepatitis B should be referred to a specialist for further management. There is no indication for antiviral intervention in acute hepatitis B. Acute case of hepatitis B should be educated regarding the risks of transmission including a healthy lifestyle, avoiding sexual contact or practicing safer-sex until partners and/or relevant contacts have been appropriately screened and notified. Hepatitis A and pneumococcal vaccines are offered and avoiding alcohol intake may prevent further liver damage.

Management of Contacts: Contacts are identified and followed-up to allow for those who are at risk of infection the opportunity to be screened and vaccinated if they are not already infected. Contacts include immediate household contacts as well as others who may be at risk through sexual contact or as a result of sharing items that may result in the transmission of hepatitis B infection.

Infants born to hepatitis B carrier mothers should be given hepatitis B vaccine as well as hepatitis B immune globulin (HBIG) immediately after delivery. Susceptible children <1 year in the same household of an acute case or a chronic carrier should also be given HBIG. Infants should also be followed by their physician for any required treatment and care.

All susceptible sexual and household contacts of acute cases of hepatitis B or of chronic carriers should be vaccinated with hepatitis B vaccine. A single dose of HBIG (0.06ml/kg) should be given for sexual contacts of the HBV infected individual if it can be administered within 14 days of last exposure.

Management of Outbreaks: When two or more cases are related to a single source then a search for additional cases is worthwhile. Outbreak protocols outlined in Section 1 of this manual are followed. If a common source is identified measures should be implemented to reduce infection.

Preventive Measures

- Vaccination is the most effective preventive measure against hepatitis B
- Screening of all pregnant women for hepatitis B status

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- Immunization for HBV and HAV if non-immune should be offered
 - A hepatitis B immunization program (grade 4) has been offered since 1995, therefore people born 1987 and since have been offered the vaccine. The immunization program for high risk individuals is also in place and can be found at http://www.health.gov.nl.ca/health/publications/immunization/pdf/immunization_manual.pdf
 - Harm reduction, education and counseling are critical in prevention strategies. Individuals identified at high risk for exposure to HBV should be counseled on:
 - Avoiding sharing drug needles or other drug paraphernalia including “works” for injection or bills or straws (Use sterile needles for injection)
 - Avoiding unsanitary tattoo and body piercing methods
 - Avoiding sharing personal items such as toothbrushes, razors, and nail clippers
 - Persons with known risk behavior(s) should be offered HIV and other STBBI testing and counseling
 - Review and monitor prevention practices at time of diagnostic testing for HBV
 - Identify barriers to prevention practices and the means to overcome them.
 - All donations of blood, tissues and organs are tested for HBV; only donations tested negative are used.
 - Infection Control Routine Practices should be in place in health care facilities to prevent exposure of health care workers to blood and body fluids
 - Information available at http://www.phac-aspc.gc.ca/hcai-iamss/bbp-pts/hepatitis/hep_b-eng.php

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list A
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Influenza

List B

Only confirmed cases of disease should be reported.

Case Definition

Confirmed Case

Clinical illness¹ with laboratory confirmation of infection:

- isolation of influenza virus from an appropriate clinical specimen
- OR
- demonstration of influenza virus antigen in an appropriate clinical specimen
- OR
- significant rise (e.g. fourfold or greater) in influenza IgG titre between acute and convalescent sera
- OR
- detection of influenza RNA

¹Clinical illness defined as influenza-like illness (ILI) is characterized as follows: acute onset of respiratory illness with fever and cough and with one or more of the following: i) sore throat ii) arthralgia iii) myalgia and iv) prostration that could be due to influenza virus. In children under 5, gastrointestinal symptoms may also be present. In patients under 5, or 65 and older, fever may not be prominent. Note: Illness associated with novel influenza viruses may present with other symptoms.

Clinical Presentation

Influenza is classically characterized by sudden onset of fever, often with chills or rigors, headache, malaise, diffuse myalgia, and nonproductive cough.

Epidemiology

Occurrence: Influenza viruses cause annual outbreaks of influenza worldwide. In Canada, influenza or “flu” season usually runs from November to April and an estimated 10-25% of Canadians may get the flu each year. Although most of these people recover completely, an estimated 4,000 to 8,000 Canadians, mostly seniors, die every year from pneumonia related to influenza and many others may die from other serious complications of influenza.

Reservoir: Aquatic birds are the primary reservoir for influenza A viruses. Humans are the primary reservoir for influenza B viruses.

Transmission: Large droplet spread is believed to be the primary means of transmission through coughing and sneezing by infected persons.

Incubation Period: Average 2 days (range 1-4 days) for seasonal influenza.

Communicability: Viral shedding is greatest in the first 3 – 5 days of illness.

Diagnosis: Clinical signs and symptoms must be confirmed by laboratory findings.

Control Measures

Management of Case: Supportive care is recommended. Droplet precautions are recommended for patients hospitalized due to influenza. Anti-virals may be recommended for those at high risk of complications from influenza, such as residents of nursing homes or those requiring hospitalization.

Management of Contacts: Contact tracing is not recommended. Contacts of cases should be given information on methods to prevent influenza.

Management of Outbreaks: An outbreak management team should be established to address infection prevention and control measures. Access to antiviral drugs is completed by the RHA.

Preventive Measures

- Education should be provided on methods to prevent the transmission of influenza. These include:
 - Clean your hands – Hand hygiene is the single most important way to prevent the transmission of infection
 - Cover your cough – Tissues or the bend of the arm should be used to cover a cough
 - Cover the nose and mouth when sneezing or coughing
 - Wash hands after coughing, sneezing or using tissues
 - Keep fingers/hands away from the eyes, nose and mouth
 - Discard tissues after wiping the nose
 - Contain your illness – If sick with influenza stay at home.
 - Provide influenza vaccine to recommended recipients prior to the influenza season
 - Provide pneumococcal vaccine to recommended recipients
- A fact sheet is available at:
<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/flu-grippe-eng.php>

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the regional medical officer of health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list B
- CDCN enters the case into the electronic reporting system and completes the FluWatch data as appropriate. An outbreak report form if indicated.
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)
 - Completes FluWatch weekly

Measles

List A

All confirmed and probable cases are notifiable provincially. Only confirmed cases of disease should be notified nationally.

Case Definition

Confirmed Case

Laboratory confirmation of infection in the absence of recent immunization with measles-containing vaccine:

- Isolation of measles virus from an appropriate clinical specimen

OR

- Detection of measles virus RNA

OR

- Seroconversion or a significant rise (e.g. fourfold or greater) in measles IgG titre between acute and convalescent sera

OR

- Positive serologic test for measles IgM antibody using a recommended assay in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently traveled to an area of known measles activity

OR

- Clinical illness** in a person who is epidemiologically linked to a laboratory-confirmed case

Probable Case

Clinical illness**

- In the absence of appropriate laboratory tests

OR

- In the absence of an epidemiological link to a laboratory -confirmed case

OR

- In a person who has recently traveled to an area of known measles activity

**Clinical Illness is characterized by all the following features:

- fever 38.3° C or greater
- cough, coryza, or conjunctivitis
- generalized maculopapular rash for at least 3 days

Clinical Presentation

Measles causes high fever, a runny nose, cough, conjunctivitis and a rash that usually lasts from 1-2 weeks. The red blotchy rash appears on the third to seventh day, starting on the face and then becomes more generalized. Complications may result from viral replication or bacterial infections. They can include pneumonia, otitis media, laryngotracheobronchitis, diarrhea and encephalitis. Encephalitis while rare can occur with a case fatality rate of about 10% and result in permanent disability in about 25%.

Very rarely a fatal brain disease called sub acute sclerosing panencephalitis develops years later.

Epidemiology

Occurrence: In countries where measles vaccine has been used, there has been a marked reduction in the incidence of measles; however, cases still occur in countries where vaccination rates are low. Canada has an enhanced weekly measles reporting system.

Reservoir: Humans

Transmission: One of the most highly communicable of all infectious diseases measles transmission is by direct contact with infectious droplets or by airborne spread and less commonly by articles freshly soiled with nose and throat secretions. Infants who are born to mothers who have had the disease are immune for about 6-9 months.

Incubation Period: Is about 7-10 days; the average interval between the appearance of the rash in the index case to subsequent cases is 14 days with a range of 7 – 18 days.

Period of Communicability: Usually 4 days before the onset of the rash to 4 days after the rash appearance in otherwise healthy persons. Permanent immunity occurs after the illness.

Diagnosis: Case confirmation is based on findings consistent with the above definition.

Control Measures

Management of Case: Treatment is symptomatic, no specific treatment available. Antibiotics are not advised for treatment of measles unless complications such as bacterial infections occur. An antiviral, ribavirin has been used for treatment, however its effectiveness is not clear. Supportive care is needed and if complications arise then hospitalization may be required. Hospitalized cases should be placed on Airborne Precautions. In the community cases should be isolated to prevent further spread to susceptible individuals.

Management of Contacts: A contact is someone who has shared the same airspace during the infectious period. Prompt identification of susceptible contacts will allow for administration of measles vaccine or Immune Globulin (IG) to prevent further infections. Special attention must be given to those who are at increased risk such as those who are immunocompromised. Once exposed to measles susceptible individuals can be given measles vaccine within 72 hours after exposure to prevent disease. Susceptible individuals who have been exposed >72 hours ago but less than 1 week, may be given IG. IG may also be given to modify or prevent disease in infants <12 months old, or among individuals for whom the vaccine is contraindicated.

Management of Outbreaks: Prompt identification of an outbreak will contribute to effective and efficient control measures. When vaccine coverage remains high the likelihood of outbreaks is reduced.

Preventive Measures

- The most effective preventive measure against measles is vaccination. The NACI statement recommends two doses of MMR vaccine given after the first birthday, at least one month apart.
- Ensure high vaccination rates are maintained in the population.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation

- RMOH reports to provincial office as per list A
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - Weekly reporting to Public Health Agency of Canada (PHAC)
 - reports the aggregate case data to PHAC

Measles Immune-globulin is obtained by contacting the DH&CS **729-3430** or the MOH after hours
1-866-270-7437.

Mumps

List B

All confirmed cases are notifiable provincially.

Case Definition

Confirmed Case

Clinical illness and laboratory confirmation of infection in the absence of recent immunization with a mumps-containing vaccine:

- isolation of the mumps virus from an appropriate clinical specimen
- OR
- detection of mumps virus RNA
- 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
- OR
- positive serologic test for mumps IgM antibody
- OR
- clinical illness *** in a person who is epidemiologically linked to a laboratory-confirmed case

Probable Case

- Clinical illness *** in the absence of appropriate laboratory tests OR in the absence of an epidemiologic link to a laboratory -confirmed case

**A laboratory confirmed case does not have to meet the clinical illness description.

***Clinical illness is characterized by acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting > 2 days, and without other apparent cause.

Clinical Presentation

An acute viral disease characterized by fever, swelling and tenderness of one or more salivary glands, usually the parotid, with possibility of orchitis in 20% - 30% of post pubertal males.

Epidemiology

Occurrence: The incidence has declined in countries where there are universal immunization programs; however, cases still occur in countries where vaccination rates are low.

Reservoir: Humans

Transmission: Droplet transmission from the saliva or respiratory secretions of an infected individual to susceptible individuals during face-to-face contact.

Incubation Period: Is about 15 days, with a range of 14 - 25.

Period of Communicability: 6 - 7 days before to 5 days after the onset of parotitis.

Diagnosis: Case confirmation is based on findings consistent with the above definition.

Control Measures

Management of Case: Treatment is symptomatic, with supportive care provided. Advise case on hygiene, respiratory etiquette and self-isolation for 5 days after symptom onset. Droplet precautions are recommended for hospitalized patients.

Management of Contacts: A susceptible contact is someone who has shared the same airspace during the infectious period. Prompt identification of contacts will allow for administration of mumps containing vaccine to prevent further infection. Special attention must be given to those who are increased risk such as those who are immunocompromised. Immunization post exposure may not prevent infection.

Management of Outbreaks: Prompt identification of an outbreak will contribute to effective and efficient control measures. When vaccine coverage remains high the likelihood of outbreaks is reduced.

Preventive Measures

- The most effective preventive measure against mumps is vaccination. The NACI statement recommends two doses of MMR vaccine be given for measles prevention after the first birthday, at least one month apart, this vaccine also contains mumps.
- Ensure high vaccination rates are maintained in the population.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the regional medical officer of health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list A
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - Reports weekly to Public Health Agency of Canada (PHAC)
 - reports the aggregate case data to PHAC
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Pertussis (Whooping Cough)

List B

Only confirmed cases of disease should be reported.

Case Definition

Confirmed Case

Laboratory confirmation of infection:

- isolation of *Bordetella pertussis* from an appropriate clinical specimen
- OR
- detection of *B. pertussis* DNA from an appropriate clinical specimen **AND** one or more of the following:
 - cough lasting 2 weeks or longer
 - paroxysmal cough of any duration
 - cough with inspiratory “whoop”
 - cough ending in vomiting or gagging, or associated with apnea

OR

- epidemiologic link to a laboratory-confirmed case **AND** one or more of the following for which there is no other known cause:
 - paroxysmal cough of any duration
 - cough with inspiratory “whoop”
 - cough ending in vomiting or gagging, or associated with apnea

Probable Case

Cough lasting 2 weeks or longer in the absence of appropriate laboratory tests and not epidemiologically linked to a laboratory-confirmed case **AND** one or more of the following, with no other known cause:

- paroxysmal cough of any duration
- cough with inspiratory “whoop”
- cough ending in vomiting or gagging, or associated with apnea

Suspect Case

One or more of the following, with no other known cause:

- paroxysmal cough of any duration
- cough with inspiratory “whoop”
- cough ending in vomiting or gagging, or associated with apnea

Clinical Presentation

The disease is characterized by three stages; it begins with mild upper respiratory tract symptoms similar to the common cold such as coryza and cough known as the catarrhal stage. The cough progresses to paroxysms of coughing often accompanied by an inspiratory whoop commonly followed by vomiting called the paroxysmal stage. Fever is absent or minimal. Symptoms gradually wane over six to ten weeks termed the convalescent stage.

Epidemiology

Occurrence: Pertussis occurs worldwide. In Canada the introduction of pertussis vaccine in the 1940s dramatically decreased the prevalence of the disease in Canada by 99%. In the last two decades there has been an increase in pertussis incidence mainly in the adolescent and adult population. While infants over six months of age are well protected by acellular vaccines, young infants who are unimmunized or partially immunized are at highest risk of severe disease and death. During the past four years

there have been 15 cases of pertussis reported in NL; 33% of these cases occurred in infants less than 1 year.

Reservoir: Humans

Transmission: Transmission occurs by close contact with cases via aerosolized droplets.

Incubation Period: The incubation is usually 7 to 10 days with a range of 5 to 21 days.

Communicability: Infected individuals are most contagious during the catarrhal stage and the first two weeks after cough onset. Factors affecting the length of communicability include age, immunization status, previous episode of pertussis, and appropriate antimicrobial therapy.

Diagnosis: Clinical signs and symptoms must be confirmed by laboratory findings.

Control Measures

Management of Case: Cases who are younger than 6 months of age and older individuals with underlying conditions commonly require hospitalization for supportive care. Antibiotics given during the catarrhal stage may decrease the symptoms. After the cough is established the antibiotics have no effect on the course of the illness but are recommended to limit the spread to others. Droplet precautions are recommended for hospitalized patients until the patient has received five days of effective antibiotic therapy. Exclude the case from contact with at risk persons until treated with an appropriate antibiotic for 5 days. Provide information to the patient/family about the disease, the importance of respiratory etiquette and about the role of vaccination in prevention.

Management of Contacts: Identify contacts as soon as possible. Provide information about the disease and respiratory etiquette practices. Review the immunization status of contacts and up date as necessary with age appropriate vaccine:

- Close contacts less than 7 years who have not received 4 doses of DTaP or who have not received DTaP within three years should be given a dose of vaccine
- Inadequately immunized household contacts < 7 years should be excluded from school or daycare until they receive 5 days of an appropriate antibiotic
- Susceptible healthcare workers, identified as having unprotected close contacts with a case, should be excluded from work until completion of five days of appropriate antibiotic
- Chemoprophylaxis is recommended for:
 - Close contacts in households and other environments, regardless of immunization status and age, where there is an infant under one year of age
 - Pregnant women contacts in the last three weeks of pregnancy
- Chemoprophylactic agents include:
 - Erythromycin x 7 days or
 - Clarithromycin x 7 days or
 - Azithromycin x 5 days
- Antimicrobial agents in infants:
 - An association between orally administered erythromycin and infantile hypertrophic pyloric stenosis (IHPS) has been reported in infants younger than 1 month

Management of Outbreaks: An outbreak management team should be established to address infection prevention and control measures.

Preventive Measures

- Educate the public especially parents that the primary strategy to prevent pertussis is immunization:
 - Five doses of acellular pertussis before the 7th birthday
 - A one-time pertussis booster vaccine (Tdap) for adolescents and adult
- Provide education on pertussis and mode of transmission
Fact sheet available at
<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/cough-toux-eng.php>
- Provide information on respiratory hygiene/cough etiquette

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list B
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Pneumococcal (Invasive) Disease (IPD)**List B**

Only confirmed cases of disease should be reported

Case Definition**Confirmed Case**

Clinical evidence of invasive disease** with laboratory confirmation of infection:

- isolation of *Streptococcus pneumoniae* (*S. pneumoniae*) from a normally sterile site (excluding the middle ear and pleural cavity)

Probable Case

Clinical evidence of invasive disease with no other apparent cause and with non-confirmatory laboratory evidence:

- demonstration of isolation of *S. pneumoniae antigen* from a normally sterile site (excluding the middle ear and pleural cavity)

**Invasive disease manifests itself mainly as pneumonia with bacteremia, bacteremia without a known site of infection, and meningitis.

Clinical Presentation

Pneumococcal disease is caused by the bacteria, *S. pneumoniae* and, there are about 90 strains. Two types of infection caused by pneumococci are local infections and invasive infections. The local infections can cause acute otitis media, acute sinusitis, acute bronchitis, and pneumonia. Invasive infections can cause bacteremia, meningitis, endocarditis, septic arthritis, osteomyelitis, and peritonitis. Invasive disease is more commonly seen among the very young, elderly and certain high risk groups. Onset of symptoms will depend on the site of infection.

Estimates are that 20% of patients (Canadian data) with pneumococcal meningitis will die. In Canada, it is estimated that *S. pneumoniae* annually causes the following in children under five years: 65 cases of meningitis, 700 cases of bacteraemia, 2200 cases of pneumonia causing hospitalization and 9000 cases of pneumonia not requiring hospitalization. Over 90% of all pneumococcal infections are caused by twenty three serotypes. Increasing resistance to antibiotics has affected successful treatment. There are about 500,000 cases of pneumococcal disease in Canada each year.

There are estimates that 40 percent of the population are asymptomatic carriers. Infection with one strain won't protect against another. Pneumococcal infections are not highly contagious yet children in daycare have higher carrier rates.

Epidemiology

Occurrence: The rate of invasive pneumococcal disease in the Canadian population was 6.8 or 1295 cases seen in 2000. There were no cases reported in NL for that year.

Reservoir: The reservoir for pneumococcal bacteria is the nose and throat of an infected individual.

Transmission: Transmission is a result of direct contact from coughing, sneezing, or kissing. It occurs directly from person to person from droplet spread and indirectly through articles freshly soiled with respiratory discharges. There are asymptomatic carriers who can unknowingly spread the disease.

Incubation Period: The incubation period for invasive pneumococcal disease is not clear but may be 1-3 days.

Period of Communicability: The individual is felt to be non-infectious 24-48 hours after the start of antibiotic treatment provided the causative strains are susceptible.

Diagnosis: Diagnosis is based on findings consistent with the above listed case definition.

Control Measures

Management of a Case: Antibiotic treatment is recommended. Antimicrobial resistance is increasing therefore it is important to determine the strain of the infecting organism in order to ensure appropriate antibiotic treatment. If symptoms are severe however, treatment should not be delayed.

Management of Contacts: No isolation precautions are necessary for persons who have pneumococcal disease. Prophylactic antibiotic treatment of child care contacts of a person with pneumococcal disease is not recommended.

Management of an Outbreak: In areas where outbreaks may take place such as in an institution, immunization with an appropriate vaccine should be implemented.

Preventive Measures

Vaccination is the best way to prevent this disease. There are two vaccines available.

- Polysaccharide pneumococcal vaccine (23 valent) has been used in NL since 1980. It is recommended for those 2 years and over who meet the criteria outlined by the NL Immunization Manual http://www.health.gov.nl.ca/health/publications/immunization/pdf/immunization_manual.pdf
- The vaccine has been found to be safe and cost-effective in preventing invasive pneumococcal disease.
- The Pneumococcal conjugate (with several serotypes) vaccine is effective in preventing the disease in young children and has been available since 2009; see Newfoundland and Labrador Immunization Manual for details.
- Avoid over crowded living conditions.
- Promote good hygiene.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list B
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Poliomyelitis – under development

Only confirmed cases of disease should be reported

Rubella and Congenital Rubella Syndrome

List A

Only confirmed cases of disease should be reported

Case Definition

Confirmed Case - Rubella

Laboratory confirmation of infection in the absence of recent immunization with rubella-containing vaccine:

- isolation of rubella virus from an appropriate clinical specimen
- OR
- detection of rubella virus RNA
- OR
- seroconversion or significant rise (e.g. fourfold or greater) in rubella IgG titre by any standard serologic assay between acute and convalescent sera
- OR
- positive serologic test for rubella IgM antibody using a recommended assay in a person with an epidemiological link to a laboratory-confirmed case or a person who has recently traveled to an area of unknown rubella activity
- OR
- clinical illness ** in a person with an epidemiological link to a laboratory-confirmed case

Probable Case

Clinical Illness **

- in the absence of appropriate laboratory tests
- OR
- in the absence of an epidemiological link to a laboratory-confirmed case
- OR
- in a person who has recently traveled to an area of known rubella activity

**Clinical illness is characterized by fever and rash, and at least one of the following:

- arthralgia/arthritis
- lymphadenopathy
- conjunctivitis

Case Definition

Confirmed Case - Congenital Rubella Syndrome (CRS)

Live birth: two clinically compatible manifestations (any combination from Table 1, Columns A and B) with laboratory confirmation of infection:

- isolation of rubella virus from an appropriate clinical specimen
- OR
- detection of rubella virus RNA
- OR
- positive serologic test for IgM antibody in the absence of recent immunization with rubella-containing vaccine
- OR
- rubella IgG persisting for longer than would be expected (approximately six months after birth) from passive transfer of maternal antibody, or in the absence of recent immunization

Still Birth: two clinically compatible manifestations with isolation of rubella virus from appropriate clinical specimen

Probable Case

In the absence of appropriate laboratory tests, a case that has at least

- any two compatible manifestations listed in Table 1, column A

OR

- one manifestation listed in Table 1, column A, plus one listed in Table 1, column B

NOTE: The following cannot be classified as a CRS case:

- rubella antibody titre absent in the infant

OR

- rubella titre absent in the mother

OR

- rubella antibody titre declining in the infant consistent with the normal decline after birth of passively transferred maternal antibody

Table 1. Congenital Rubella Syndrome: Clinically Compatible Manifestations

Column A	Column B
1. Cataracts or congenital glaucoma (either one or both count as one) 2. Congenital heart defects 3. Sensorineural hearing loss 4. Pigmentary retinopathy	1. Purpura 2. Hepatosplenomegaly 3. Microencephaly 4. Micro ophthalmia 5. Mental retardation 6. Meningoencephalitis 7. Radiolucent bone disease 8. Developmental or late onset conditions such as diabetes & progressive panencephalitis & any other conditions possibly caused by rubella virus

Clinical Presentation

Rubella is generally a mild viral illness characterized by a mild rash in about 50% of cases. While children are usually asymptomatic adults have a low grade fever, headache, mild coryza, malaise and conjunctivitis may appear 1-5 days before the onset of rash. The most characteristic sign is lymphadenopathy and it can begin 5-10 days prior to the appearance of the rash and involves occipital, post auricula and posterior cervical nodes. Transient arthralgia and less often arthritis can occur in up to 50% of women and adolescents. The maculopapular rash last about 3-5 days, begins on the face and can spread to the chest arms and trunk. One in every 6000 develops encephalopathy.

Infections during the first 10 weeks of pregnancy have an 85% risk of CRS. Congenital rubella infection can result in miscarriages, stillbirths and fetal malformations, including congenital heart disease, cataracts, deafness, and developmental delays. The risk of CRS is greatest in the first trimester but very uncommon after 20 weeks gestation.

Epidemiology

Occurrence: In Canada in 2000 there were 29 cases of rubella compared to 704 cases in 1991. In NL there have been no cases of rubella since 1991.

Reservoir: Humans

Transmission: Transmission occurs through droplet from the respiratory secretions of an infected individual.

Incubation Period: The incubation period is between 14-17 days with a range of 14-21 days.

Period of Communicability: Rubella is highly contagious for those who are non-immune. It can be transmitted 1 week before and at least 4 days after the onset of the rash. Infants with CRS can shed the virus for up to one year.

Diagnosis: Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case: There is no specific treatment. Infected individuals should be isolated to prevent further spread until 7 days after the onset of the rash. Contacts should be identified to ensure that pregnant women are made aware of the risks. Droplet precautions for hospitalized cases.

Management of Contacts: test contacts for susceptibility and advise accordingly.

Management of Outbreaks: Outbreaks occur rarely in Canada as a result of high immunization rates. Target vaccination programs may be useful during an outbreak.

Preventive Measures

The most effective preventive measure against rubella is vaccination. Rubella vaccine should be given after the first birthday. Rubella is included in the MMR vaccine and Canadian children are recommended to have 2 doses.

The pre-natal screen in Canada includes screening for immunity to rubella. Identification of those who are non-immune offers the opportunity for vaccination and avoidance of further risk during subsequent pregnancies.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list A (CRS) or list B (rubella)
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Tetanus

List B

Only confirmed cases of disease should be reported

Case Definition

Confirmed Case

Clinical illness** without other apparent medical cause with or without laboratory evidence of *Clostridium tetani* or its toxin and with or without history of injury

**Clinical Illness is characterized by acute onset of hypertonia and/or painful muscular contractions (usually of the muscles of the jaw and neck), and generalized muscle spasms without other apparent medical cause.

Clinical Presentation

Tetanus most often results from an injury when tetanus spores enter the skin through a small cut or wound. For those with adequate protection from immunization they will not develop the illness. Once tetanus spores enter through a puncture wound or laceration a susceptible individual, toxin is released by the tetanus bacteria and can cause severe disease. The toxin reaches the spinal cord through the blood stream. This release of the toxin results in excess stimulation of muscles throughout the body. This causes the muscles to contract uncontrollably along with severe pain. Swallowing can become difficult. A spasm of the muscles can result in death if the airway is blocked. The death rate is 10-20%. Some other complications from tetanus are weight loss, fractures from the muscle spasms, pneumonia from the prolonged illness, and possible speech difficulties or memory and mental impairment.

Epidemiology

Occurrence: The incidence of tetanus among Canadians is very low. During the 1990's the number of cases seen annually ranged from 1-7. The last death reported in Canada was in 1995. About half the cases were seen in those over 50 years of age.

Reservoir: Tetanus spores can be found in the environment, most often in soil. It can also be found in the intestines of animals and humans. If a susceptible individual has a puncture wound or laceration, it provides a site where the spores can enter the body. Once the spores begin to grow they can release their toxin.

Transmission: Transmission does not occur from person to person. Transmission occurs through a laceration or other break in the skin which allows entry of the tetanus spores. Adequate immunization (Td booster every 10 years) prevents this disease.

Incubation Period: The incubation period for tetanus is usually 3-21 days.

Period of Communicability: Tetanus is not transmitted from person to person.

Diagnosis: Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case: If an individual develops tetanus, the treatment is to give tetanus immune globulin (TIG) in doses of 3000-6000 IU given IM. A series of Td should also be started. See the Newfoundland and Labrador Immunization Manual for clarification. The wound should be cleansed surgically if necessary and antibiotics started. TIG is given as soon as possible and medication to relieve and prevent muscle spasms. Hospitalization and treatment in intensive care may be needed.

TIG is available through the DH&CS 729-3430 or the MOH after hours 1-866-270-7437

Management of Contacts: Tetanus is not spread from person to person but from spores in the environment. Contact tracing is not necessary.

Management of Outbreaks: Outbreaks are rare but may occur if high vaccination rates are not maintained. In developing countries where immunization programs are nonexistent or are disrupted as a result of instability, people still die from this disease.

Preventive Measures

The most effective preventive measure against tetanus is immunization. In Canada and other developed countries tetanus immunization is included in our routine vaccination programs. It is estimated that those not protected in Canada are mostly among those who are elderly, those who are born outside of Canada and those with no records. Efforts should be made to increase rates among these groups. Tetanus prophylaxis in wound management is based on whether the wound is clean or contaminated.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list B
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)

Varicella (Chickenpox)

List B

Only confirmed cases of disease should be reported

Case Definition

Confirmed Case

Clinical evidence of illness and laboratory confirmation of infection:

- isolation or direct antigen detection of varicella-zoster virus (VZV) from an appropriate clinical specimen

OR

- seroconversion or significant rise (e.g. fourfold or greater) by and standard serologic assay in varicella-zoster IgG titre between acute and convalescent sera

OR

- positive serologic test for varicella-zoster IgM antibody

OR

- Clinical evidence of illness in a person with an epidemiological link to a confirmed case of chickenpox or VZV infection

Probable Case

Clinical evidence of illness in the absence of laboratory confirmation or epidemiological link to a confirmed case of chickenpox or VZV infection

Clinical Presentation

An infection with varicella zoster virus can result in chickenpox if it is the first infection and shingles or zoster if it is the second infection. Zoster generally occurs decades after the initial infection. Varicella presents with fever, headache, and a rash that is maculopapular for a few hours, vesicular for 3-4 days and leaves a granular 5 scab. The vesicles collapse when punctured. These lesions mostly occur in successive crops, with various stages of maturity all at the same time. The lesions may be present on the scalp, axilla, mucous membrane of the mouth upper respiratory tract and the conjunctivae.

They may be abundant or mild and not profuse enough to note that an infection is present. Complications are seen more frequently if the infections occur in adolescence, adulthood or immunocompromised host, with higher rates of encephalitis, pneumonia and death. Babies who develop varicella within the first 28 days are at higher risk from developing severe generalized varicella.

Complications from infection include secondary bacterial skin infections, otitis media, bacteraemia, osteomyelitis, septic arthritis, endocarditis, necrotizing fasciitis, toxic shock like syndrome, mild hepatitis and thrombocytopenia.

Infections that occur early in pregnancy may result in congenital varicella syndrome in 0.7% of cases. After 13-20 weeks gestation the incidence is 2%.

Herpes Zoster or shingles is a reactivation of latent varicella infection in the dorsal root ganglia in a localized area. The lesions are restricted to an area supplied by the sensory nerves along nerve pathways and are usually unilateral causing severe pain.

Epidemiology

Occurrence: The incidence is worldwide. In Canada, 50% of children are immune by the age of 5 years and 90% by the age of 12 years. Individuals from the tropics are less likely to be immune to varicella.

Reservoir: Humans

Transmission: Varicella is highly contagious among those susceptible, usually young children. It is spread by direct contact with the virus shed from skin lesions or in oral secretions through the airborne route.

Incubation Period: The incubation period is from 10-21 days but generally between 14-16 days.

Period of Communicability: The contagious period is from 1-2 days before the onset of the rash and lasts until the rash is over. It is mostly a childhood disease with 50% of children becoming infected prior to school entry and 90% infected by the age of 9 years.

Those with zoster may be infectious for a week after the appearance of the vesiculopustular lesion. Infection usually confers immunity but a very mild case (few spots) may leave a person vulnerable for a second infection.

Diagnosis: Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case: Caution parents against the use of aspirin as it increases the incidence of Reye's syndrome among those with varicella infection.

The Canadian Pediatric Society advised that children no longer needed to be excluded from school or childcare if they have varicella, provided that they are feeling well and don't have a large number of lesions, unless there is an immunocompromised child in the class. Hospitalized cases should be isolated to prevent possible transmission to those who may be immunosuppressed.

Specific treatment for varicella infection is antivirals such as acyclovir but it is not routinely used for healthy children.

These antivirals must be used within 24 hours after the appearance of the rash to be effective. Antivirals if given within the first 5 days may shorten the duration of the rash for zoster (shingles). They are recommended for those who are at high risk from varicella infection, including healthy adults and adolescence, those with chronic skin or lung disorders, those on long term aspirin therapy, those with a depressed immune system and those who are on corticosteroids.

Varicella Zoster Immune Globulin (VZIG) is not effective once symptoms have developed. To access VZIG call the DH&CS **729-3430** or the MOH after hours **1-866-270-7437**.

Management of Contacts: Susceptible contacts of cases can be given varicella vaccine. If administered within 3 days of exposure it is likely to prevent or reduce the severity of the disease.

VZIG within 96 hours of exposure may prevent or modify disease in susceptible close contacts of cases. Persons ineligible for immunization, such as susceptible pregnant females, and those at high risk of severe disease should be evaluated for VZIG.

Management of Outbreaks: Immunization may be considered in consultation with the RMOH.

Preventive Measures

The most effective preventive measure against varicella is vaccination. A single dose is advised for children preferably given between aged 12-18 months, but it can be given up to 12 years of age. Those greater than 13 years of age require 2 doses given 4-8 weeks apart. See The Canadian Immunization Guide for further information on the vaccine.

Immunization of household contacts of those who are at high risk of infection will reduce the risk of contracting varicella.

Procedure and Reporting Requirements

- Physicians, laboratories and communicable disease control nurses (CDCNs), and infection control practitioners (ICPs) must immediately report suspect or confirmed cases to the Regional Medical Officer of Health (RMOH)
- RMOH office will notify local physicians, nurse practitioners, environmental health officers, community health nurses, CDCNs, and ICPs, in the particular region as required for follow-up and case investigation
- RMOH reports to provincial office as per list B
- CDCN enters the case into the electronic reporting system and completes an outbreak report form if indicated
- Provincial Disease Control
 - reports the aggregate case data to Public Health Agency of Canada
 - provides an analysis of the case/s with reports in the Communicable Disease Report (CDR)