4.10 Poliomyelitis

Etiology

Polio is caused by poliovirus, a member of the enterovirus subgroup of the *Picornaviridae* family. There are three types: type 1, 2, and 3. The virus is extremely stable and can remain viable in the environment for a long period of time. It is rapidly inactivated by heat, formaldehyde, chlorine and ultraviolet light.

Case Definitions

Confirmed Case

Clinical illness[7] with laboratory confirmation of infection:

- isolation of polio virus (vaccine or wild-type) from an appropriate clinical specimen

OR

- detection of polio virus RNA

OR

- clinical illness in a person epidemiologically linked to a laboratory-confirmed case

Probable Case

Clinical illness without detection of polio virus from an appropriate clinical specimen and without evidence of infection with other neurotropic viruses but with one of the following laboratory confirmations of infection:

- Significant rise (e.g., fourfold or greater) in polio IgG titre by any standard serologic assay between acute and convalescent sera **OR**
- Positive serologic test for polio IgM antibody in the absence of recent immunization with polio virus-containing vaccine

Suspected Case

Clinical illness and no laboratory confirmation of infection (no polio virus detection or serologic evidence), including negative test results and inadequate or no investigation.

[7] Clinical illness is characterized by all of the following:

- Acute flaccid paralysis of one or more limbs
- Decreased or absent deep tendon reflexes in the affected limbs
- No sensory or cognitive loss
- No other apparent cause (including laboratory investigation to rule out other causes of a similar syndrome) of neurologic deficit present 60 days after onset of initial symptoms, unless the patient has died

Confirmed Case Categories

Confirmed cases of poliomyelitis can be further subdivided into the following two categories:

1) Wild virus

Laboratory investigation implicates wildtype virus. This group is further subdivided as follows:

- Imported: travel in or residence in a polio-endemic area 30 days or less before onset of symptoms
- Import-related: epidemiologic link to someone who has travelled in or resided in a polio-endemic area within 30 days of onset of symptoms
- Indigenous: no travel or contact as described above

2) Vaccine-associated virus

Laboratory investigation implicates vaccine-type virus. This group is further subdivided as follows:

- Recipient: the illness began 7-30 days after the patient received oral polio vaccine (OPV)
- Contact: the patient was shown to have been in contact with an OPV-recipient and became ill 7-60 days after the contact was vaccinated
- Possible contact: the patient had no known direct contact with an OPV-recipient and no history of receiving OPV, but the paralysis occurred in an area in which a mass vaccination campaign using OPV had been in progress 7-60 days before the onset of paralysis
- No known contact: the patient had no known contact with an OPV-recipient and no history of receiving OPV, and the paralysis occurred in an area where no routine or intensive OPV vaccination had been in progress. In Canada, this would include all provinces and territories.

Clinical Presentation

Poliomyelitis is a highly infectious disease. The clinical presentation of poliovirus infection is variable and is typically categorized based on the severity of symptoms. Manifestations range from in apparent or asymptomatic infections to severe paralysis and death. Asymptomatic infections occur in up to 95% of cases. The virus enters through the mouth and begins to multiply at the site of implantation (pharynx and gastrointestinal tract). The virus is commonly present in the throat and stool before symptoms are apparent. One week after onset the virus is rarely found in the throat but continues to be excreted in the stool for 3-6 weeks. The virus infects lymph tissue and enters the blood stream. It may then invade cells of the central nervous system (CNS). The replication of the virus occurs in motor neurons of the anterior horn and brain stem resulting in cell destruction. This is the cause of the typical manifestations of poliomyelitis.

A minor or nonspecific illness occurs in 4-8% of cases. Symptoms may include fever, malaise, headache, nausea, and vomiting. There is little or no evidence of CNS invasion. Three syndromes are associated with this type of infection: upper respiratory infection, gastrointestinal upset and influenza-like illness. Aseptic meningitis (occasionally with parenthesis) occurs in a small number of individuals after the minor illness has resolved. A more severe form of infection is characterized by the onset of acute flaccid paralysis (AFP). This occurs in about 1% of infections. Severe muscle pain and stiffness of the neck and back with paralysis may occur.

Paralytic polio is classified into three types depending on the level of involvement. Spinal polio is the most common (79% of paralytic polio cases) and is characterized by asymmetric paralysis usually of the legs. Bulbar polio occurs in about 2% of paralytic polio cases and is manifested by weakness of muscles innervated by cranial nerves. Bulbospinal polio accounts for about 19% of cases and is a combination of spinal and bulbar polio. The duration of the paralysis is usually short, lasting 3-4 days. Rarely will the paralysis remain but if it extends beyond 60 days it is usually permanent. Cranial nerve involvement and paralysis of respiratory muscles can occur.

Post-polio syndrome (PPS) affects polio survivors 10-40 years after recovery from an initial paralytic polio attack. PPS is not thought to be caused by persistence of the virus but rather by the death of nerve terminals in the motor units that remain after the initial attack of polio. It is characterized by further weakening of muscles that were previously affected by the polio infection. Individuals may experience fatigue, slowly progressive muscle weakness, joint pain and increasing skeletal deformities. Some individuals experience only minor symptoms and others have more severe symptoms. The extent to which individuals will suffer PPS depends on how seriously they were affected by the original polio attack; it is usually not life threatening.

Diagnosis

To confirm polio in suspected cases consultation should be made with the MOH and the Public Health Laboratory (PHL) to determine the appropriate specimens required. The PHL can be accessed through the web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

In 2007, poliomyelitis was limited to just four countries (Afghanistan, India, Nigeria, and Pakistan) that had not yet been successful in achieving complete eradication. Canada was declared polio-free as of 1994. However, detection of the virus and recording of cases has been ongoing. Since 1994, there have been twelve cases of polio reported in Canada; eleven were caused by vaccine-associated polio-virus due to the administration of OPV. The use of OPV was discontinued in 1995/1996 in Canada, and since that time there have not been any cases of vaccine-associated paralytic poliomyelitis. However, OPV is still used in many parts of the world. There is a constant threat of poliomyelitis acquisition due to travel.

Reservoir

Humans. No long-term carriers of wild type polio virus have been detected.

Transmission

Poliomyelitis is highly infectious with seroconversion rates among household contacts nearing 100% and is transmitted person-to-person mainly via the fecal-oral route. It can also be transmitted via throat secretions. Food and water contaminated with feces may also be vehicles for transmission.

Incubation Period

The incubation period is 3 - 35 days. It is typically 7-14 days for paralytic cases.

Communicability

Communicability is present as long as the virus can be excreted. The virus can remain in the throat for one week, and it can remain in feces between three to six weeks.

Control Measures

Management of Case

A single case constitutes a public health emergency.

Investigations

- Obtain a case history
- Estimate the dates for period of communicability
- Verify immunization history
- Identify the possible source of infection
- Identify contacts
- Collaborate with the MOH regarding a follow-up plan

Treatment

- No specific treatment, treatment should be based on the symptoms of the patient
- Contact Precautions for hospitalized patients
- Special handling of contaminated articles in the home setting
- In areas where there is modern sewage disposal, feces and urine can be discharged directly into the sewers

Immunization

- If a case has not been immunized with inactivate polio vaccine (IPV) or if the immunization status is uncertain he/she should be immunized according to the Newfoundland and Labrador Immunization Manual available on website

http://www.health.gov.nl.ca/health/publichealth/cdc/health_pro_info.html#immunization

Exclusion

Cases should be excluded from childcare, school or work as directed by the MOH.

Management of Contacts

Definition

An individual who has direct or indirect contact with fecal or oral secretions of a case of poliomyelitis.

Immunoprophylaxis

All contacts should be appropriately updated with the age appropriate polio schedule.

Chemoprophylaxis

Not recommended.

Exclusion

Isolation of household contacts maybe of little benefit since the infection has usually spread by the time the first case is suspected. The exclusion of susceptible contacts from childcare, school and work will be directed by the MOH.

Management of Outbreaks

An outbreak management team should be established to address infection prevention and control measures.

Education and Prevention Measures

- Routine immunization of eligible populations is crucial in preventing the emergence of polio cases.
- The general public needs to be educated on the risks and benefits of polio immunization.
- Travelers should be immunized against polio
- All cases and contacts should be made aware of the disease and the possible outcomes
- Additional information on polio is available at the following web site http://travel.gc.ca/travelling/health-safety/diseases/polio
- A fact sheet is available at this web site http://www.who.int/mediacentre/factsheets/fs114/en/index.html

Reporting Requirements and Procedures

- The laboratory (hospital or public health laboratory) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officer of Health (MOH)

- MOH office will notify, as required, local physicians, nurse practitioners, environmental health officers, community health nurses, communicable disease control nurses (CDCNs) and Infection control practitioners (ICP), in the particular region as required for follow-up and case investigation

- The CDCN in collaboration with the ICP (if necessary) will collect case details
- The CDCN enters the case details into the electronic reporting system and uses the Canadian Network for Public Health Intelligence (CNPHI) tool, if indicated, for alerts or outbreak summaries

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 Quarterly Communicable Disease Report (CDR), also posted on the Public Health website http://www.health.gov.nl.ca/health/publichealth/cdc/informationandsurveillance.html
- Coordinates the response if an outbreak occurs across RHAs

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