Poliomyelitis

Epidemiology in New Zealand

Wild poliovirus has been eliminated from New Zealand with the last case of wild poliovirus occurring in New Zealand in 1977. No cases of vaccine-associated paralytic poliomyelitis (VAPP) have occurred in New Zealand since the introduction of inactivated polio vaccine (IPV) in 2002.

Internationally, and as of July 2017, states infected with wild poliovirus include Pakistan, Afghanistan and Nigeria.1 While there is an extremely low risk of cases being imported to New Zealand from these countries, all countries remain at risk of importing polio, especially those countries in the Lake Chad basin (including Cameroon, the Central African Republic, Chad and Niger). Unimmunised travellers who travel to infected states are at risk of infection.

On 5 May 2014 the Director-General of the World Health Organization declared the international spread of wild poliovirus a Public Health Emergency of International Concern (PHEIC) under the International Health Regulation, 2005.


Case definition

Clinical description

Poliomyelitis is caused by wild poliovirus types 1, or 3 or by live vaccine-derived poliovirus. Wild poliovirus type 2 was declared globally eradicated in 2015. Infection is established in the gastrointestinal tract. A minor illness (fever, malaise, headache, vomiting) occurs in about 10 percent of infections. Over 90 percent of infections are asymptomatic or involve non-specific fever. In a minority of cases (less than 1 percent), infection spreads to the central nervous system and is characterised by:

- having no other apparent cause
- acute flaccid paralysis (AFP) of one or more limbs with decreased or absent deep tendon reflexes in affected limbs
- no sensory or cognitive loss
- a possible effect on bulbar muscles.2

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In children who develop paralysis the illness may be biphasic, with the initial phase of a mild febrile illness of one to three days’ duration indistinguishable from that of many other viral infections. The child appears to recover, only to be struck down abruptly two to five days later with meningism, followed by paralysis. In adults and adolescents, the illness usually presents with a gradual onset of paralysis and muscular pain without the early symptoms.

**Laboratory testing for diagnosis**

Laboratory confirmation requires isolation of poliovirus or detection of poliovirus nucleic acid from a clinical specimen. Different types of poliovirus will need to be tested for, depending on the type of polio suspected (for example, wild polioviruses or vaccine-derived strains).

All specimens must be tested in a laboratory accredited by the World Health Organization (WHO). The national poliovirus reference laboratory at ESR is accredited for poliomyelitis testing. ESR tests for poliovirus by polymerase chain reaction (PCR) with a turnaround time of 48 hours and by viral culture with a turnaround time of 10 days.

The case should be urgently discussed with the local virologist/medical microbiologist. It is important to ascertain the presence or absence of poliovirus as quickly as possible.

The following clinical specimens can be collected for detecting the presence of polioviruses or related antibodies:

- two stool samples collected 24 hours apart within 14 days’ onset of the paralysis (or rectal swab with faecal material if stool is not immediately available)
- cerebrospinal fluid
- a nasopharyngeal swab or throat swab
- EDTA blood
- Serum.

Contact ESR for specific advice on specimens required and on packing and transporting the specimens. The clinical specimens should be transported to the local laboratory and/or ESR as soon as possible.

**Case classification**

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable**: A clinically compatible illness with an epidemiological link.³  
• **Confirmed**: A clinically compatible illness that is laboratory confirmed.  
• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition, including cases under the age of 15 years who have been deemed to have a non-polio paralytic illness by the National Certification Committee for the Eradication of Polio.

Cases can be further classified as follows.

• **Vaccine-associated paralytic poliomyelitis (VAPP)**: A rare event where neurological damage is caused by a virus ingested from the oral polio vaccine (OPV). A mutation of the vaccine virus known as a reversion causes previously attenuated poliovirus to revert to a more neuro-virulent form. The paralysis that results is identical to that caused by wild poliovirus.

• **Wild virus-associated poliomyelitis**: Any case not meeting the criteria for being vaccine associated. Such cases will be imported since New Zealand was declared free of poliomyelitis by WHO in 2000.

• **Imported**: A case occurring in a person who has travelled or resided in a polio-endemic area within 35 days of disease onset or who is epidemiologically linked to a person who has done so. Surveillance should be intensified at both local and national levels to detect any additional cases without delay.

• **Vaccine derived poliomyelitis**: Vaccine-derived poliovirus (VDPV) is the live, attenuated strain of the poliovirus contained in the OPV that has changed and reverted to a form that can cause paralysis in humans and has the capacity for sustained circulation. Vaccine-derived polioviruses differ from the parental (original) Sabin strains found in the vaccine by 1 percent to 15 percent of VP1 nucleotides. This is a measurement of genetic change that scientists use to monitor the circulation of viruses.

### Spread of infection

#### Incubation period

The incubation period for polio is usually 7–14 days for infections resulting in AFP, although the reported range is 3 to 35 days.

#### Mode of transmission

Poliovirus is passed person to person, principally via the faecal–oral route, but potentially also via respiratory droplets.

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³ An epidemiological link is defined here as a history within the past 35 days of one or more of (a) travel to high-risk countries (wild poliovirus-endemic countries, see http://www.polioeradication.org/Infectedcountries/PolioEmergency.aspx. for an up-to-date list), (b) exposure to high-risk individuals (a person with polio infection, a person immunised with OPV within the last two months, a person with a history of travel to high-risk countries within the last three months, a recent recipient of OPV, or a person working with poliovirus in a laboratory), (c) exposure to poliovirus in a laboratory.
**Period of communicability**

The period of communicability of the poliovirus has not been precisely defined, but transmission is possible as long as the virus is excreted. Poliovirus has been detected in throat secretions as early as 36 hours, and in faeces 72 hours, after exposure to infection. It typically persists in the pharynx for about one week and in faeces for three to six weeks. However, it may be shed in the faeces of immunocompromised people for several years. Cases are most infectious in the days immediately before and after the onset of any symptoms.

**Notification procedure**

All people suspected of suffering from polio must be notified to the medical officer of health by the clinician caring for the patient, and they must be appropriately investigated.

Laboratories must immediately notify the local medical officer of health of any polio-positive VP1-based sequencing.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health, including the Director of Public Health, and check that the paediatrician has notified the case to the New Zealand Paediatric Surveillance Unit (NZPSU).

There should be a higher index of suspicion if there is clinically compatible illness with an epidemiological link. The local medical officer of health is responsible for ensuring adequate isolation of the case after hospital discharge, and identification and management of the case contacts.

Ensure complete case information is entered into EpiSurv.

Under the WHO's International Health Regulations 2005 (IHR), assessment of any suspected case of poliomyelitis must occur within 48 hours of initial identification, and any isolation of wild poliovirus must then be notified to the WHO via the National Focal Point within 24 hours of confirmation. This confirmation must have been undertaken by the WHO-accredited National Poliovirus Reference Laboratory at ESR. In New Zealand, the National Focal Point is the Office of the Director of Public Health, Ministry of Health.

**Notifying cases of acute flaccid paralysis as part of the WHO global eradication programme**

As part of the WHO initiative to eradicate polio, New Zealand has a programme of surveillance and investigation of all cases of AFP in children under the age of 15. Such cases are required to be reported by telephone to the New Zealand Paediatric Surveillance Unit at the Department of Women’s and Children’s Health, University of Otago, Dunedin, and to have a full clinical and epidemiological assessment and virological investigation of stool specimens. All cases are discussed by the National Certification Committee for the Eradication of Polio, and records of its deliberations are reported to the WHO.

All children with AFP should have two stool samples (or rectal swab with faecal material if stool is not immediately available) collected 24 hours apart within 14 days onset of the...
paralysis. These should be sent to ESR via the local laboratory, as per current AFP surveillance.

For more detailed information on AFP surveillance, see the NZPSU website at http://www.otago.ac.nz/nzpsu/polio/index.html

Management of case

The occurrence of a single non-vaccine-associated paralytic case in a community warrants immediate investigation.

Investigation

Early identification of other cases will help to control spread. Review of possible recent cases may provide evidence of the source of an indigenous case.

Obtain a history of vaccination, travel and contact with recently returned travellers. For poliomyelitis serology collect an acute serum specimen as early in the course of disease as possible, and a convalescent specimen should be obtained at least three weeks later. Ensure laboratory confirmation has been attempted.

Case details should be gathered as soon as possible by public health units, using the ESR case report form (https://surv.esr.cri.nz/episurv/crf.php). Details to be included are demographic details, vaccination history, history of recent travel, immune competency, onset and range of symptoms, and type and results of laboratory tests.

Infection prevention and control considerations

Enteric precautions are required during a person’s hospital stay if polio is suspected or confirmed, and droplet precautions are required if there are pharyngeal symptoms.

When the person with polio is discharged home, they should stay at home until six weeks have passed since the onset of symptoms, or until two consecutive stool specimens taken at least seven days apart are negative for poliovirus. Contact with others should be limited but strict isolation is not necessary.

At home, a high standard of hygiene must be maintained until two clear stool specimens are obtained. Hand hygiene is the single most important means of preventing the spread of infection. After going to the toilet, all cases should wash their hands well with soap and warm water for 15–20 seconds and then dry them thoroughly, preferably with a disposable hand towel. An antiseptic hand gel, rubbed in for 15–20 seconds, is a good alternative when hands are not visibly soiled. The usual bathroom and wash facilities may be used and the surfaces disinfected with dilute bleach. Within the home, contact with others should be limited but strict isolation is not necessary.

Treatment

Supportive care should be given to address symptoms. Cases of polio should be under the care of an infectious diseases paediatrician or physician.
Management of contacts

Definition

A contact is defined as any individual potentially exposed through (a) infectious faecal material, either from close physical contact or shared toilet facilities, or (b) droplet spread, with a suspected or confirmed case of polio during his/her potentially infectious period.

High-risk contacts

Those at high risk of acquiring and/or transmitting poliovirus include:

- household members who live with the index case
- close social contacts – family and friends who have spent a lot of time with the index case while he/she has been infectious
- children in shared day care with the index case while he/she has been infectious
- Food handlers and childcare workers who may have had contact with the index case while he/she has been infectious.

Low-risk contacts

Those at low risk of acquiring and/or transmitting poliovirus include:

- individuals who may have had other contact with, or shared a toilet with, the index case while he/she has been infectious
- Individuals who have been consumers of food prepared by the index case while he/she has been infectious.

High-risk contacts should be sought, and ways of communicating with low-risk contacts should be determined.

General advice for all contacts

All contacts, regardless of previous vaccination, should be informed about the infection, encouraged to use good hygiene practices, and asked to report any symptoms to their medical practitioner. The local public health unit will ensure appropriate general information is given to the local primary care practitioners.

If a contact suffers from an illness with neck, back or leg stiffness, severe muscle pain or neurological symptoms, he/she should seek medical advice. The medical practitioner is advised to:

- refer the patient to hospital as a suspected case of polio
- Notify the local medical officer of health of a suspected case of polio.

If a contact suffers from a minor non-specific illness (e.g., fever, malaise, headache, nausea, or vomiting) or an influenza-like illness, the medical practitioner is advised to:

- test the contact for poliovirus (see ‘Laboratory testing for diagnosis’ above)
- reinforce messages about hand hygiene and disinfection practices
• emphasise the importance of seeking medical attention if symptoms worsen or neurological symptoms occur
• Notify the local medical officer of health of a possible case of polio.

Additional advice for high-risk contacts
As well as the above, high-risk contacts should:
• have two stool specimens taken 24 hours apart tested for poliovirus, and a throat swab or nasopharyngeal swab if respiratory symptoms are present
• be excluded from early childhood services, school or work for six weeks after contact with a case, or until two stool specimens, at least 24 hours apart, are negative for poliovirus
• wipe down surfaces in toilet and bathroom facilities with a disinfecting solution of dilute bleach\(^4\) (10 ml of bleach in \(\frac{1}{2}\) litre water) and make a fresh solution every 24 hours
• avoid strenuous physical activity, intramuscular injections and potential causes of injury, and not undergo a tonsillectomy (as any of these might increase their risk of infection and paralysis)
• Have a primary course or booster polio vaccination (see below).

The local public health unit should regularly monitor high-risk contacts to check for the development of symptoms and provide information as needed, and inform the medical practitioner they are doing so.

Laboratory investigation of other contacts is not necessary unless they develop symptoms.

Other contacts should be advised of the importance of hand hygiene and advised to see a medical practitioner for any illness but will not be restricted.

Prophylaxis
Although there is no known post-exposure protection from polio infection, vaccination of high-risk contacts is recommended even though some contacts may already be infected at the time of vaccination.

If there is a certain history of a completed course of polio vaccination (three doses using any combination of OPV – which is no longer used in New Zealand – and IPV given at least four weeks apart), a booster dose of IPV should be offered. If in any doubt, a full primary course of IPV should be offered.

A full primary course of IPV, with at least four weeks between doses, should be offered if the person has:
• no history of polio vaccination
• an uncertain history of polio vaccination
• a history of an incomplete primary course.

\(^4\) Use household bleach (sodium hypochlorite) with a concentration of at least 5% hypochlorous acid/sodium hypochlorite.
OPV will not be used as part of the vaccination protocol for contacts during a polio outbreak response because (a) it is not currently available in New Zealand, (b) of the already high immunisation coverage in New Zealand, and (c) of the risk of VAPP.

For young, high-risk contacts, vaccination should be aligned with the National Immunisation Schedule, if possible, after the initial dose.

Although there are no known adverse effects on the foetus following polio vaccination during pregnancy, as a general precaution vaccination is not advised for pregnant women in the first and second trimester in a low-risk setting. However, pregnant high-risk contacts susceptible to paralytic polio should be immunised as per the vaccination protocol during a polio outbreak.

Because there is an absence of evidence on the protective role of IPV vaccination after possible exposure, contacts vaccinated need to be informed that they are not necessarily protected by vaccination, and that they should still contact a health provider if they develop any of the symptoms suggestive of polio.

**Health education**
In early childhood services or other institutional situations, ensure that satisfactory facilities and practices are in place for hand cleaning; nappy changing; toilet use and training; food preparation and handling; and cleaning of sleeping areas, toys and other surfaces.

**References and further information**
