

# Poliomyelitis

## 1. DISEASE REPORTING

### A. Purpose of reporting and surveillance

1. To identify cases of polio.
2. To prevent transmission of polio.
3. To distinguish between wild-type polio and vaccine-associated paralytic polio.

### B. Legal Reporting Requirements

1. Health care providers: **immediately notifiable to local health jurisdiction**
2. Health care facilities: **immediately notifiable to local health jurisdiction**
3. Laboratories: Poliovirus, acute, by IgM positivity or PCR positivity **immediately notifiable to local health jurisdiction**; specimen submission is required – isolate or clinical specimen associated with positive result (2 business days)
4. Local health jurisdictions: **immediately notifiable to the Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES)**

### C. Local Health Jurisdiction Investigation Responsibilities

1. Begin the investigation and notify CDES immediately.
2. Facilitate transport of specimens to Washington State Public Health Laboratories (PHL).
3. Implement appropriate infection control measures.
4. Report all *confirmed* and *probable* cases (see definitions below) to CDES. Complete the polio investigation form (available at <http://www.doh.wa.gov/notify/forms/polio.pdf>) and enter the data into the Public Health Issues Management System (PHIMS).

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### Background

Wild polio virus was eliminated from the western hemisphere in 1991 but remains endemic in Nigeria, India, Pakistan and Afghanistan, where control efforts are ongoing. Beginning in 2003, polio re-emerged in many countries in Africa, facilitated by refugee movement. For up-to-date information regarding worldwide polio transmission see: <http://www.polioeradication.org/Dataandmonitoring/Poliothisweek.aspx>

### A. Etiologic Agent

Poliovirus (enterovirus subgroup) is an RNA virus. There are three serotypes (1, 2 and 3), and all can cause paralysis. There is no cross-protective immunity for the serotypes. Clinical poliomyelitis can be caused by wild-type viruses and, rarely, attenuated live (oral) vaccine strains.

**B. Description of Illness**

The virus infects the throat and intestine, with invasion of local lymph nodes. Up to 95% of polio infections are inapparent or asymptomatic. Some persons have nonspecific mild illnesses including fever, sore throat, or gastrointestinal symptoms. In rare cases poliovirus infects the spinal cord or brain stem resulting in aseptic meningitis or acute asymmetric flaccid paralysis, which occurs in approximately one of 200 poliovirus infections. Symptoms of paralytic polio typically progress within a few days, achieve a plateau for weeks, and then resolve partially or fully. Legs are more often affected than arms. Bulbar paralysis affecting the cranial nerves may accompany extremity involvement or can occur as the sole paralysis.

**C. Polio in Washington**

The last endemic transmission of wild polio virus infection in the United States was in 1979; the last case of wild virus infection identified in Washington occurred in 1977. Vaccine-associated paralytic polio (VAPP) continued to occur sporadically, including in a Washington resident in 1993 who contracted the virus from a grandchild recently vaccinated with oral polio vaccine (OPV). In 1997, the ACIP recommended routine use of inactivated (IPV) rather than oral polio vaccine to eliminate the risk of vaccine-associated paralytic polio in the United States. In 2000, an all IPV vaccine schedule was implemented which greatly reduced the occurrence of vaccine-associated paralytic polio. However, an unvaccinated Arizona resident contracted VAPP in 2005 during international travel to a polio-endemic area where oral vaccine is in use.

**D. Reservoir**

Humans, usually persons with an inapparent infection.

**E. Modes of Transmission**

Polio is mainly transmitted by the fecal-oral route including through contaminated water but can also be transmitted through droplet spread of respiratory secretions of an infected person. Infants shedding virus in the feces after having received OPV have been the source of exposure for susceptible adults giving child care.

**F. Incubation Period**

Typically 6 to 20 days, range 3 to 35 days.

**G. Period of Communicability**

Persons with polio are most contagious shortly before and after the onset of symptoms. The virus is present in respiratory secretions for about a week and in the feces for up to six weeks after onset of illness. Persons with asymptomatic infections are also communicable.

**H. Treatment**

Treatment is supportive and can include respiratory support and physical therapy especially following acute paralytic illness.

## I. Immunity

Whereas OPV produces intestinal immunity, IPV protects only against paralytic disease and does not prevent intestinal infection or subsequent shedding of the virus.

## 3. CASE DEFINITIONS

### A. Poliomyelitis, paralytic (2010)

Case classification

*Probable:* Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss.

*Confirmed:* Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss; AND in which the patient

- has a neurologic deficit 60 days after onset of initial symptoms; or
- has died; or
- has unknown follow-up status

Comment

All suspected cases of paralytic poliomyelitis are reviewed by a panel of expert consultants before final classification occurs. Confirmed cases are then further classified based on epidemiologic and laboratory criteria<sup>1</sup>. Only confirmed cases are included in Table I in the *MMWR*. Suspected cases are enumerated in a footnote to the *MMWR* table.

<sup>1</sup>Sutter RW, Brink EW, Cochi SL, et al. A new epidemiologic and laboratory classification system for paralytic poliomyelitis cases. *Am J Public Health* 1989;79:495-8.

### B. Poliovirus infection, nonparalytic (2010)

Case classification

*Confirmed:* Any person without symptoms of paralytic poliomyelitis in whom a poliovirus isolate identified in an appropriate clinical specimen with confirmatory typing and sequencing performed by the CDC Poliovirus Laboratory, as needed.

Comment

In 2005, a vaccine-derived poliovirus (VDPV) serotype 1 was identified in a stool specimen obtained from an immunodeficient Amish infant and, subsequently, from 4 other children in 2 other families in the infant's central Minnesota community<sup>1</sup>. Epidemiological and laboratory investigations determined that the vaccine-derived poliovirus had been introduced into the community about 3 months before the infant's infection was identified and that there had been virus circulation in the community. Investigations in other communities in Minnesota and nearby states and Canada did not identify any additional infections or any cases of paralytic poliomyelitis.

Although OPV is still widely used in most countries, IPV replaced OPV in the United States in 2000<sup>2</sup>. Therefore, the Minnesota poliovirus infections were the result of importation of a VDPV into the United States and the first time a VDPV has been shown

to circulate in a community in a developed country<sup>3</sup>. Circulating VDPVs commonly revert to a wild poliovirus phenotype with increased transmissibility and high risk for paralytic disease; they have recently caused polio infections and outbreaks of paralytic poliomyelitis in several countries<sup>3</sup>. Introduction of VDPVs in communities with low polio vaccination coverage pose the potential for transmission leading to outbreaks of paralytic poliomyelitis.

Because of the success of the routine childhood immunization program in the United States and the Global Polio Eradication Initiative, polio has been eliminated in the Americas since 1991. Because the United States has used IPV exclusively since 2000, the occurrence of any poliovirus infections in this country is a cause for concern. Reflecting the global concern for poliovirus importations into previously polio-free countries, the World Health Assembly of the World Health Organization has added circulating poliovirus to the notifiable events in the International Health Regulations (IHR)<sup>4</sup>.

#### References

<sup>1</sup> CDC. Poliovirus infections in four unvaccinated children – Minnesota, August-October 2005. MMWR; 54(41); 1053–1055.

<sup>2</sup> CDC. Poliomyelitis prevention in the United States. Updated recommendations from the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(No. RR-5).

<sup>3</sup> Kew OM, Sutter RW, de Gourville EM, Dowdle WR, Pallansch MA. Vaccine-derived polioviruses and the endgame strategy for global polio eradication. Ann Rev Microbiol 2005;59;587-635.

<sup>4</sup> CDC. Brief report. Conclusions and recommendations of the Advisory Committee on Poliomyelitis Eradication — Geneva, Switzerland, October 2005. MMWR 2005;54;1186-8.

## 4. DIAGNOSIS AND LABORATORY SERVICES

### A. Laboratory Diagnosis

The laboratory diagnosis of polio is made by isolation of the polio virus from stool, throat specimens, urine or CSF (rare). Stool cultures are most likely to yield the organism. Acute and convalescent serologic tests can be done, but may be difficult to interpret because the rise in titer may occur prior to paralysis.

### B. Tests Available at Washington State Public Health Laboratories (PHL)

PHL does not perform testing for polio virus but specimens should be sent to PHL as soon as possible. PHL will forward specimens to CDC for testing.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

### C. Specimen Collection

Stool and throat specimens for viral culture should be collected on any patient suspected to have polio. In general, a minimum of two specimens collected at least 24 hours apart should be obtained as early in the illness as possible. Acute and convalescent serum can be collected although a rise in titer often occurs prior to the onset of paralysis.

Communicable Disease Epidemiology Section will assist with the determination of which

additional specimens should be collected for diagnostic study. All specimens should be shipped to PHL with a completed Virus Examinations form available at:

<http://www.doh.wa.gov/EHSPHL/PHL/Forms/SerVirHIV.pdf>

## 5. ROUTINE CASE INVESTIGATION

Since polio has been eradicated in most of the world, confirmation of polio in a Washington resident will require an extensive investigation.

### A. Evaluate the Diagnosis

Review the clinical presentation, physical exam findings (particularly flaccid paralysis), immunization history and risk factors for infection (e.g., recent travel to an endemic area or possible exposure to a person that recently received oral polio vaccine). If pursuit of laboratory testing is deemed appropriate, facilitate collection of appropriate specimens and the transport of specimens to Public Health Laboratories (PHL), as needed. If a commercial laboratory isolates polio virus in cell culture, request that the laboratory send the cell culture to PHL for confirmatory testing immediately.

### B. Identify Source of Infection

Ask about the following exposures in the 3–35 days prior to onset:

- Travel to an endemic area
- Travel to or contact with persons from an area where OPV is used
- Contact with a traveler arriving from an endemic area
- Contact with a person who recently received OPV

### C. Identify Potentially Exposed Persons

If polio is confirmed, DOH and the Centers for Disease Control and Prevention will assist with an extensive contact investigation. See below for Contact Management.

## 6. CONTROLLING FURTHER SPREAD

### A. Infection Control Recommendations / Case Management

1. Hospitalized patients should be cared for using contact precautions for the duration of the illness.
2. If a person is confirmed to have polio, DOH and CDC will assist in making other infection control recommendations for the management of the case.

### B. Contact Management

DOH and CDC will also assist with managing contacts of persons with polio. Contacts should be surveyed regarding polio vaccination status, immune status, and recent compatible illness and stool samples for viral culture should be obtained. Vaccination with IPV should be offered to susceptible contacts with emphasis on persons with ongoing risk of exposure. Monitor contacts for symptoms. (MMWR 2005;54(41):1053–55)

## 7. MANAGING SPECIAL SITUATIONS

Special situations will be handled on a case by case basis.

## 8. ROUTINE PREVENTION

### A. Immunization Recommendations

Inactivated polio vaccine (IPV) contains three polio serotypes and is recommended for all children in the United States to be given in a four-dose series with doses at 2 months, 4 months, 6–18 months and 4–6 years. The fourth dose should be administered on or after the fourth birthday and at least 6 months after the previous dose. If 4 doses are administered prior to age 4 years, a fifth dose should be administered at age 4 to 6 years. In the event the third dose was given on or after the fourth birthday a fourth dose is not required for school entry.

Adults who have never been vaccinated against polio should receive three doses of IPV if they are:

- Traveling to polio-endemic or high-risk areas of the world.
- Working in a laboratory and handling specimens that might contain polioviruses.
- A health care worker in close contact with a person who could be infected with poliovirus.

Adults at high risk of coming in contact with polio virus who have received the 3 dose primary series should receive a booster dose of IPV.

Although no longer recommended in the United States, OPV is used elsewhere and can cause paralytic disease in unimmunized travelers if exposed (such as through contaminated food or water.) It is important to remember that IPV protects against paralytic polio but not intestinal infection. It is possible that a person vaccinated with inactivated polio vaccine could acquire an intestinal polio infection (wild type or VDPV) during travel to a polio-endemic area or to an area where OPV is used and subsequently transmit the virus to others through the fecal-oral route without becoming ill.

For additional information regarding polio vaccination see:

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11<sup>th</sup> ed. Washington DC: Public Health Foundation, 2009.

### B. Prevention Recommendations

Control of polio is accomplished through immunization. Unimmunized persons at risk of exposure, for example during travel to areas with known polio cases or areas where OPV is used, should maintain strict prevention measures to avoid potential fecal-oral transmission. These include using good hand washing techniques and safe drinking water during travel to areas with endemic polio and maintaining good hygiene practices if in contact with infants that are receiving oral vaccine.

## ACKNOWLEDGEMENTS

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**UPDATES**

January 2010

Section 1: The investigation form link was updated and 2010 case classification information was added.

January 2011:

The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.