



Report Immediately

Poliomyelitis

Disease Plan

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Questions about this disease plan?

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✓ WHY IS POLIOMYELITIS IMPORTANT TO PUBLIC HEALTH?

Polio, or poliomyelitis, is a crippling and potentially deadly infectious disease, caused by the poliovirus, and only affects humans. The virus spreads from person to person through respiratory droplets or fecal matter. The virus can invade an infected person's brain and spinal cord, causing paralysis.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

The severity of the clinical manifestations of poliovirus infection can be highly variable.

- *Clinically unapparent* disease accounts for nearly 95% of poliovirus infections.
- *Abortive poliovirus* occurs in 4-8% of cases and is characterized by non-specific viral symptoms that resolve within a week. The three syndromes most commonly observed are upper respiratory tract infections, gastrointestinal disturbances, and influenza-like illness.
- *Non-paralytic aseptic meningitis* develops in 1-5% of infected persons. The symptoms usually follow a mild prodrome, and may last 2-10 days before complete recovery.
- *Paralytic poliomyelitis* is characterized by asymmetric, acute flaccid paralysis with loss of reflexes in the involved limbs. It occurs in only 0.1-2% of cases and usually presents with fever.

Paralytic symptoms usually begin 1-10 days after prodromal symptoms and will progress for 2-3 days. Usually, no further paralysis occurs after fever subsides. After the acute episode, many patients recover at least some muscle function. Weakness or paralysis still present 12 months after onset is usually permanent. Risk factors for paralytic disease include larger inoculum of poliovirus, increasing age, pregnancy, strenuous exercise, tonsillectomy, and intramuscular injections administered while the patient is infected with poliovirus.

Of persons infected with paralytic poliomyelitis, 25-40% will develop post-polio syndrome 30-40 years later. This syndrome is characterized by muscle pain, exacerbation of existing weakness, and/or development of new paralysis or weakness. Risk factors for developing this syndrome include increasing time since acute polio infection, the presence of permanent residual impairment after recovery of the acute illness, and being female.

Causative Agent

Polioviruses are enteroviruses. There are three serotypes of polioviruses that cause disease. All are capable of causing paralysis, however, type 1 is most frequently isolated from paralytic cases and is the cause of most epidemics. Types 2 and 3 viruses are more likely to be associated with vaccine-associated paralytic poliomyelitis (VAPP) than type 1.

Differential Diagnosis

Differential diagnosis includes Guillain-Barré syndrome, tick paralysis, paralytic rabies, acute transverse myelitis, diphtheria, buckthorn poisoning, botulism, myasthenia gravis, neuroinvasive West Nile virus, and acute brachial neuritis.

Laboratory Identification

Viral Culture

Virus isolation is the most common and optimal test for poliovirus infection. Samples should be collected as soon as possible, ideally within 14 days of symptom onset. To increase the probability of isolating poliovirus, two or more samples should be collected at least 24 hours apart. Stool specimens collected two or more months after onset of paralytic manifestations are unlikely to yield poliovirus. If poliovirus is isolated, it must be tested further at the CDC to determine if the virus is wild-type or vaccine type. A stool specimen is the most likely source to isolate poliovirus, followed by throat swabs and CSF. Submission to CDC should be coordinated through the Utah Department of Health (UDOH) epidemiologist.

RT-PCR

RT-PCR can also be used to identify poliovirus and to determine if the virus is wild-type or vaccine type. RT-PCR is sensitive and specific, and results are available earlier than with viral culture. Throat swabs, CSF, serum, urine, and stool samples have all been used to isolate poliovirus.

Serology

Serologic methods are not the preferred method for diagnosing poliovirus infection. Serologic test results can be difficult to interpret, cannot distinguish between wild-type and vaccine type infections, and may produce false-negative results because neutralizing antibodies appear early in the course of infection and may already be at high levels by the time sera are collected, and titers may not change. A four-fold rise in neutralizing antibody between the acute and convalescent specimens (collected 3-4 weeks apart) is suggestive of acute poliovirus infection. Other serologic methods include neutralization, complement fixation, and IFA.

Utah Public Health Laboratory (UPHL): UPHL can provide culture for enteroviruses.

Treatment

There is no specific treatment for poliovirus.

Case Fatality

Case-fatality rates for paralytic polio are estimated to be 2-5% for children and 15-30% for adults.

Reservoir

Humans are the only known hosts of poliovirus.

Transmission

Poliovirus is primarily transmitted from person-to-person via the fecal-oral route, though oral-oral transmission has been documented. In rare instances, the virus has been transmitted by contaminated sewage or water. All infected persons, regardless of clinical manifestation, are capable of spreading disease.

Susceptibility

Thanks to the Global Polio Eradication Program, polio no longer occurs in many parts of the world. The last documented indigenous transmission of wild poliovirus in the United States was in 1979. The Western hemisphere was certified polio-free in 1994. However, poliovirus infection may still occur in the United States among unimmunized persons who are exposed to poliovirus in areas of the world with active circulation, or are linked to a case with imported poliovirus. Infection with poliovirus results in life-long, serotype-specific immunity. However, infection with one serotype does not protect against infection with another. In temperate climates, poliovirus infections are most common in the summer and in fall.

Incubation Period

The incubation period for paralytic poliomyelitis is usually 6-20 days, with a range of 3–35 days. In persons developing asymptomatic or mild poliovirus infection, the incubation period is typically 3–6 days.

Period of Communicability

Persons infected with poliovirus are most infectious from 7 to 10 days before and after the onset of symptoms, but poliovirus may be present in the stool for as long as 3-6 weeks. In recipients of oral (live) polio vaccine (OPV), the virus persists in the throat for 1–2 weeks, and is excreted in feces for several weeks, although in rare cases, excretion for more than two months can occur.

Epidemiology

Prior to the widespread use of polio vaccine, poliomyelitis occurred worldwide. Polio was epidemic in the U.S. for the first half of the 20th century, with over 57,000 cases of paralytic disease identified in 1952. After the introduction of vaccination, the reported number of cases of poliomyelitis in the U.S. dropped to less than 100 in 1965, and less than 10 in 1973. The last case of wild-type polio disease in the Western Hemisphere was detected in Peru in 1991. The Western Hemisphere was declared free from indigenous wild-type poliovirus transmission in 1994. However, importation of wild-type poliovirus from areas that still have endemic disease can occur among under-immunized tourists, immigrants, or even unimmunized U.S. residents, regardless of travel history. The last two outbreaks of poliomyelitis in the U.S. were reported among groups opposed to immunization due to religious beliefs.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all suspect cases of disease, and fill out and submit appropriate disease investigation forms.
- Provide education to the general public and clinicians regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.

Prevention

Vaccination is the best way to prevent infection with poliovirus. Since the poliovirus is transmitted via the fecal-oral or respiratory routes, respiratory etiquette, hand hygiene, and social distancing during illness may help prevent infection.

Chemoprophylaxis

Appropriate vaccination of all close contacts can prevent further disease spread. However, often by the time one case is recognized, the virus has already infected susceptible contacts.

Vaccination

All children should receive four doses of inactivated poliovirus (IPV) prior to school entry. IPV is recommended to be given at 2 months, 4 months, 6–18 months, and 4–6 years of age. Children who have previously been vaccinated with only oral polio virus (OPV) should receive one dose of IPV before entering school.

If the poliovirus vaccines are administered according to their licensed indications for minimum ages and intervals between doses, administration of four doses of IPV or OPV in any combination by 4–6 years of age is considered a complete poliovirus vaccination series. A child must have at least one IPV dose prior to school entry.

The primary series of IPV for adults consists of three doses of IPV. The second dose should follow the first by 4-8 weeks, and the third should follow the second by 6–12 months.

In circumstances where accelerated protection is needed, the minimum interval between doses of poliovirus vaccine is 4 weeks. Previously vaccinated persons who are considered to be at increased risk of exposure to poliovirus (e.g., travelers to polio-endemic areas, laboratory workers) should receive a single additional dose of IPV.

At least 90% of IPV vaccine recipients develop immunity to all three polioviruses after two doses of vaccine. At least 99% of vaccine recipients will develop protective antibodies after three doses. The duration of immunity after a full series of IPV is not completely known, but it is thought to provide protection for many years.

Vaccine-associated paralytic poliomyelitis (VAPP) is a rare adverse reaction following live OPV vaccine. It is thought to occur through a mutation or reversion in the vaccine virus to a form similar to wild-type virus. VAPP is more likely to occur in persons 18 years of age and older, and immune-deficient children. OPV has not been used in the U.S. since 2000; the last case of VAPP acquired in the U.S. occurred in 1999.

Immunization during pregnancy should be avoided because of theoretical risk, although no effects on developing fetuses have been documented. If immediate protection is needed, IPV vaccine is recommended.

Isolation and Quarantine Requirements

Isolation: Persons infected with paralytic poliomyelitis should remain isolated for six weeks after the onset of symptoms, or until poliovirus can no longer be recovered from feces. The UDOH will determine the number of negative specimens needed on a case-by-case basis. Additionally, all throat discharges, feces, and articles soiled with either should be properly disinfected or disposed of. Isolation is not required for persons with non-paralytic poliovirus.

Hospital: Standard and contact precautions for six weeks after onset of symptoms, or until poliovirus can no longer be recovered from feces, should be followed. The UDOH will determine the number of negative specimens needed on a case-by-case basis.

Quarantine: Contacts with an unknown or incomplete immunization history should remain quarantined until appropriate immunization is completed.

✓ CASE INVESTIGATION

Reporting

If paralytic poliomyelitis is suspected, it should be reported immediately to public health in Utah. Non-paralytic poliovirus infections should be reported to a public health entity within three working days.

Table of criteria to determine whether a case should be reported to public health authorities.

Criterion	Reporting		
<i>Clinical Evidence</i>			
Acute onset, flaccid paralysis	N	N	
<i>Laboratory Evidence</i>			
Isolation of poliovirus from a clinical specimen			S
Order of a culture for poliovirus	O		S
Order for acute and convalescent serum anti-polio IgG antibodies	O		

<i>Epidemiological Evidence</i>			
Resident of or international travel to country using OPV in past 30 days		O	
Receipt of oral polio vaccine in last 30 days		O	
Contact with person who has received oral polio vaccine in the last 75 days		O	
0 doses of polio vaccine (IPV or OPV)		O	

Notes:

S = This criterion alone is Sufficient to identify a case for reporting.

N = All “N” criteria in the same column are Necessary to identify a case for reporting.

O = At least one of these “O” criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to identify a case for reporting. (These optional criteria are alternatives, which means that a single column will have either no O criteria or multiple O criteria; no column should have only one O.

Case Definition

Poliomyelitis (CSTE, 2010)

Paralytic Poliomyelitis

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.

Non-paralytic Poliovirus Infection

Confirmed: Any person without symptoms of paralytic poliomyelitis in whom a poliovirus isolate is identified in an appropriate clinical specimen (e.g., stool, cerebrospinal fluid, oropharyngeal secretions), with confirmatory typing and sequencing performed by the CDC Poliovirus Laboratory, as needed.

NOTE: 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 (11). Only confirmed cases are included in Table I in the *MMWR*. Suspected cases are enumerated in a footnote to the *MMWR* table.

CSTE Case Classification Table

Criterion	Paralytic Poliomyelitis		Non-paralytic Poliovirus
	Confirmed	Probable	Confirmed
<i>Clinical Evidence</i>			
Acute onset, flaccid paralysis in one or more limbs	N	N	N
Decreased tendon reflexes in the affected limbs	N	N	N
No sensory deficit	N	N	N
No cognitive deficit	N	N	N
Paralysis present 60 days after onset of initial symptoms		O	
Death		O	
Follow-up status unknown		O	
Other apparent cause of paralysis (e.g., trauma to affected limb, spinal cord injury)	A	A	A
<i>Laboratory Evidence</i>			
Isolation of poliovirus from a clinical specimen			S

Notes:

S = This criterion alone is sufficient to classify a case

N = All “N” criteria in the same column are Necessary to classify a case.

A = This criterion must be absent (e.g., NOT present) for the case to meet the case definition.

O = At least one of these “O” (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all other “N” criteria in the same column—is required to classify a case.

Epidemiologic Classification

Confirmed cases are further classified based on epidemiologic and laboratory criteria.

Indigenous case: Any case which cannot be proved to be imported.

Imported case: A case which has its source outside the United States. A person with poliomyelitis (United States resident or other) who has entered the United States, and had onset of illness within 30 days before or after entry.

Case Investigation Process

- Fill out a morbidity form and appropriate investigation forms.
- Assure that all case contacts are identified and appropriately managed.
- Assure that appropriate laboratory testing and characterization occurs.

Outbreaks

A single case of paralytic poliomyelitis is considered an outbreak. Identify all close contacts and define population groups at specific risk, and immunize.

Identifying Case Contacts

Close contacts are people who have the following contact with the case patient during the infectious period (10 days before symptom onset, to 6 weeks after symptom onset):

- Household and immediate family members (those who spend many hours together or sleep under the same roof)
- Those who have direct contact with throat secretions or feces
- Healthcare workers with face-to-face contact with a patient
- Caretakers who handle materials soiled with throat secretions or feces
- Those who share confined space during the communicable period. Such contacts may include:
 - Core groups of close friends, social contacts, boyfriends, or girlfriends
 - Students within the same kindergarten class or grade level
 - Contacts at church activities and employment
 - Participants in extracurricular activities (such as fieldtrips)
 - Children attending after-school care or a playgroup

Case Contact Management

- Assess immunity.
 - Contacts must be able to produce documentation of vaccination; a verbal history of vaccination is not sufficient.
- Vaccinate susceptible contacts.
- Provide educational materials to inform contacts of their exposure and vaccination recommendations.

✓ REFERENCES

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✓ VERSION CONTROL

Update. August 2015: Revisions to document format.

Update. February 2016: Revisions to document format and added UT-NEDSS Minimum/Required Fields by Tab.

✓ UT-NEDSS Minimum/Required Fields by Tab

MORBIDITY EVENT

Demographic

- Last Name
- Street
- City
- State
- County
- Zip Code
- Date of Birth
- Area Code
- Phone Number
- Birth Gender
- Ethnicity
- Race

Clinical

- Disease
- Onset Date
- Date Diagnosed
- Hospitalized
- Admission Date
- Died
- Date of Death

Laboratory

- Test Type
- Organism
- Test Result
- Collection Date
- Lab Test Date

Epidemiological

- Imported From
- Risk Factors

Reporting

- Date first reported to public health

Administrative

- State Case Status (completed by UDOH)
- Outbreak Associated
- Outbreak Name