POLIOMYELITIS

Report Immediately by phone

Also known as: Polio, Polioviral Fever and Infantile Paralysis

Responsibilities:
Hospital: Report immediately by phone
Lab: Report immediately by phone, send isolate to University Hygienic Lab (ULH)
Physician: Report immediately by phone
Local Public Health Agency (LPHA): Follow-up required. Iowa Department of Public Health will lead the follow-up investigation.

Iowa Department of Public Health
Disease Reporting Hotline: (800) 362-2736
Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

Polio is caused by poliovirus (genus *Enterovirus*), which has three serotypes. Type 1 virus is most frequently involved in epidemics and is most often isolated from paralytic cases of poliomyelitis. Type 3 and, to a lesser degree, types 1 and 2 can also cause paralysis. All three are contained in the vaccine.

B. Clinical Description

Infection with poliovirus results in a spectrum of manifestations. The overwhelming majority of infections (95%) are asymptomatic. About 4 – 8% of infected individuals will experience non-specific viral symptoms, such as a low-grade fever, headache, sore throat, nausea, abdominal pain, constipation, diarrhea, and/or vomiting (referred to as abortive disease). About 1–2% of infections will result in aseptic meningitis, involving stiffness of the back, neck and/or legs, at times with paresthesias, a few days after the minor illness has resolved. Less than 1% of infections will progress to acute flaccid paralysis (AFP) with loss of reflexes in the involved limbs, usually with fever present (paralytic poliomyelitis). Please note, today in the U.S., the most common cause of AFP is Guillain-Barré syndrome (GBS). Polio has been eradicated from the western hemisphere.

Progression to paralytic poliomyelitis usually occurs within 2 – 4 days and rarely continues after the fever subsides. Spinal paralysis is typically asymmetric and more severe proximally than distally. Paralysis may compromise respiration and swallowing. After the acute episode, many patients recover at least some muscle function and prognosis for recovery can usually be established within 6 months after onset of paralytic disease. Between 2 – 5% of paralytic infections in children are fatal, in adults it is up to 15 – 30%. 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.

C. Reservoirs

Humans are the only known host.

D. Modes of Transmission

The principal mode of transmission is person-to-person by the fecal-oral route. Transmission via oral secretions, such as saliva, is very uncommon but may account for some cases. In rare instances, the virus may be transmitted by contaminated sewage or water. Asymptomatic individuals, especially children, comprise a significant source of infections. No reliable evidence of spread by insects exists.

No long-term carrier state is known. In temperate climates, poliovirus infections are most common in the summer and fall.

E. Incubation period

Paralytic polio: The incubation period is usually 7 - 14 days, with a range of 3 - 35 days.

F. Period of Communicability or Infectious Period

The period of communicability is not precisely defined. It appears to be greatest 7 - 10 days before and after onset of clinical symptoms, when poliovirus is present in the throat and excreted in the highest quantities in the feces. Poliovirus can continue to be shed in the feces for 3 - 6 weeks. Poliovirus can be found in throat secretions as early as 36 hours and in the feces 72 hours after exposure to infection in both symptomatic and asymptomatic cases.

G. 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 20,000 cases of paralytic disease in 1952. The first inactivated poliovirus vaccine (IPV) was introduced in 1955, monovalent oral poliovirus vaccine (OPV) in 1961, trivalent (TOPV) in 1963, and enhanced inactivated poliovirus vaccine (eIPV) in 1987. After the introduction of vaccination, the reported number of cases of poliomyelitis in the U.S. dropped to <100 in 1965 and <10 cases in 1973. The last cases of indigenously-transmitted wild-type poliovirus in the U.S. were in 1979. 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. Poliomyelitis is now on the verge of worldwide eradication.

Almost the entire world is now considered polio-free. Worldwide efforts to eradicate polio in the few countries where the disease is still endemic are underway. Strategies include: (1) achieving and maintaining high vaccination coverage among infants < 1 year old; (2) developing sensitive surveillance systems for AFP including a laboratory network; (3) conducting National Immunization Days; (4) and conducting "mopping-up" campaigns to directly target geographic areas known to be high risk for polio transmission. The number of countries where poliovirus continues to be isolated has decreased substantially, with Afghanistan, Nigeria, Pakistan and Somalia the major areas of wild-type virus circulation.

Due to the success of global efforts towards eradication and the elimination of indigenously transmitted disease in the Western Hemisphere, cases of paralytic poliomyelitis in the industrialized countries have become almost non-existent. During the period 1980–94, there was an average of 8–9 cases of paralytic polio reported annually in the U.S. Most of these cases were vaccine-associated paralytic poliomyelitis (VAPP), which can occur after receipt of OPV. This very rare disease accounted for an average of 8 reported cases per year in the US, during the period 1980–94 (or 1 case for every 2.4 million doses of OPV distributed). The risk for VAPP is highest after receipt of the first dose of poliovirus vaccine, occurring at one case per 750,000 doses distributed. Since 1986, the only cases of paralytic poliomyelitis occurring in the US have been vaccine-associated.

In January 1997, in an effort to reduce the risk of VAPP, a sequential polio vaccination schedule (IPV for doses 1 and 2, OPV for doses 3 and 4) was recommended in the US. With the continued success of worldwide efforts to eradicate poliovirus and in the interest of completely eliminating the occurrence of VAPP, an all-IPV immunization schedule was initiated on January 1, 2000 in the US.

Despite the great achievement in polio eradication in the U.S., vigilance is needed because of the possibility of importation of wild poliovirus from areas of the world where it is endemic. The importation of wild poliovirus from polio-endemic regions of the world may occur among under-immunized (1) tourists, (2) immigrants revisiting their countries of origin, or (3) members of religious groups opposed to vaccination, regardless of travel history. In 1992–93 an outbreak occurred in the Netherlands among members of a religious group that refuse immunization. Poliovirus has also been

isolated from members of a similar religious group in Canada, although no cases of disease occurred. Polio remains endemic in three countries: Afghanistan, Nigeria and Pakistan. In addition, Cameroon and Somalia are considered infected but not currently exporting Polio.

H. Bioterrorism Potential

None.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To distinguish between wild-type and vaccine-associated polio and to identify susceptible people exposed to wild-type polio.
- To maintain indigenous transmission rates of wild-type poliovirus at zero.
- To identify cases of VAPP that might occur secondary to immunization with OPV given in another country.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report any suspected or confirmed cases of polio immediately. The reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736. If after business hours, call IDPH at the same number and instructions will be given on how to reach on-call staff.

Laboratory Testing Services Available

After communicating with IDPH, contact the University of Iowa State Hygienic Laboratory (SHL) bacteriology department at (319) 335-4500 for further instructions.

The likelihood of poliovirus isolation is highest from stool specimens, intermediate from pharyngeal swabs, and very low from blood or spinal fluid. The isolation of poliovirus from stool specimens contributes to the diagnostic evaluation but does not constitute proof of a causal association of such viruses with paralytic poliomyelitis. Isolation of virus from the cerebrospinal fluid (CSF) is diagnostic but is rarely accomplished.

To increase the probability of poliovirus isolation, at least two stool specimens and two throat swabs should be obtained 24 hours apart from patients with suspected poliomyelitis as early in the course of the disease as possible (i.e., immediately after poliomyelitis is considered as a possible differential diagnosis), but ideally within the first 14 days after onset of paralytic diseased. Specimens should be sent to the State Hygienic Lab.

C. Local Public Health Agency Follow-up Responsibilities

Polio follow-up and case investigation is undertaken by the Local Public Health Agency (LPHA) and will be coordinated if necessary with IDPH Bureau of Disease Prevention and Immunization.

Initial Question to Ask Healthcare Provider and Patient

In order to assess the likelihood that a suspect case is a true case prior to laboratory testing, LPHA and/or other public health staff helping in the investigation should ask about: 1) clinical information, 2) polio immunization history of case and close contacts, 3) pertinent medical history including underlying illness/immunosuppression, 4) membership in religious/social group that might refuse immunization, 5) country of origin and length of residence in US, 6) recent history of travel (where and dates), 7) whether there were any recent out-of-town visitors (from where and dates), and 8) whether occupation entails handling of specimens that might contain poliovirus (*e.g.,* lab work).

3) CONTROLLING FURTHER SPREAD

A. Minimum Period of Isolation of a Suspect or Confirmed Case

Place case on enteric precautions for six weeks after onset of symptoms or until poliovirus can no longer be recovered from feces (the number of negative specimens needed will be determined by the IDPH on a case-by-case basis).

B. Minimum Period of Quarantine of Contacts

None.

C. Protection of Contacts of a Case

Implement control measures as described below while waiting for laboratory confirmation. While indigenous transmission of wild-type poliovirus in the United States (and the Western Hemisphere as a whole) has not occurred since 1991, the importation of poliovirus from polio-endemic regions may occur among under-immunized (1) tourists, (2) immigrants revisiting their countries of origin, or (3) members of religious groups who might refuse immunization, regardless of travel history. Polio-endemic regions include Afghanistan, Nigeria and Pakistan. An IDPH epidemiologist can help assess the likelihood of exposure to wild-type polio.

OPV is still being used outside of the U.S. Vaccine-associated paralytic poliomyelitis (VAPP) should also be considered as a cause of paralysis, especially if a patient has onset of paralysis after receipt of a first dose of OPV. No control measures are indicated if the case is determined to likely be VAPP. It is also possible that the case of paralysis is due to an infectious agent other than poliovirus, such as enterovirus, or due to some other noninfectious cause, and therefore not contagious. Therefore, it is crucial that laboratory testing be initiated to determine if the causative agent of paralysis is poliovirus and to differentiate wild-type from vaccine strain poliovirus.

Identify individuals or groups who may have been exposed to the case. Also, attempt to identify the route of introduction of poliovirus into the community. To identify these groups, think in terms of "zones of exposure" and consider members of the following groups:

- Household members
- School/ child care associates (students/attendees and staff)
- Staff and patients at medical facility where patient was cared for, especially if there was the potential for direct contact with feces or oral secretions
- Religious/social groups
- Sports teams and other extracurricular groups
- Bus mates
- Close friends
- Travelers from polio-endemic regions such as Afghanistan, Egypt, India, Niger, Nigeria, and Pakistan
- Any other persons who may have come in direct contact with the case's feces or oral secretions

Identify high-risk susceptibles who had contact with the case during infectious period:

- Pregnant women should be referred to their obstetricians. (In child care or school settings remember to determine whether teachers, student-teachers, staff or students are pregnant.)
- Immunocompromised individuals should be referred to their healthcare providers.
- Infants < 6 weeks old (who are too young to have been vaccinated) should be referred to their pediatricians.

Identify and vaccinate all other susceptibles $\geq$ 6 weeks old with IPV (if not contraindicated). These are individuals without proof of immunity, including those with medical or religious exemptions to immunization. Proof of immunity to poliovirus is defined as:

- For children (< 18 years of age): documentation of receipt of $\geq$ 4 doses of polio vaccine with a minimum interval of 4 weeks between doses; only 3 doses are needed when the third dose is given on or after the fourth birthday.
- For adults ($\geq$ 18 years of age): documentation of receipt of $\geq$ 3 doses of polio vaccine with a minimum interval of 4 weeks between doses with documentation of $\geq$ 1 booster dose.

Remember, an individual who has received a primary series consisting of ≥ 3 doses of vaccine AND has received ≥ 1 booster dose does **NOT** need to receive another dose.

Note:

- Vaccinating an exposed individual who may be incubating poliovirus is not harmful. Immune globulin (IG) has been found to be of no value as postexposure prophylaxis and is not recommended. (If the use of OPV for a mass vaccination campaign to control a polio outbreak in the U.S. is indicated, the CDC will advise the IDPH on how to obtain an emergency supply of OPV, who should receive OPV, and any other pertinent control measures.)

Apply precautions and isolate/exclude as follows:

- Case: Place on enteric precautions and exclude for 6 weeks after onset or until virus can no longer be recovered from feces (the number of negative specimens needed will be determined on a case-by-case basis).
- Contacts: Administer IPV; do not exclude.

Surveillance

Active surveillance for acute flaccid paralysis and other symptoms of polio infection should continue for at least 2 incubation periods (*i.e.,* up to 70 days) beyond the onset of the last case in an area.

D. Preventive Measures

Vaccination, including routine childhood vaccination, catch-up vaccination of adolescents, and targeted vaccination of high-risk adult groups, is the best preventive measure against polio. Good personal hygiene (particularly proper handwashing) is also very important.

Routine Polio Childhood Immunization Recommendations

An all-IPV polio immunization schedule is now the recommended schedule. OPV is no longer recommended and is not available in the U.S. Four doses of IPV are usually needed to complete the primary series: doses are recommended at ages 2 months, 4 months, 6-18 months, and 4–6 years. At least 28 days are needed between doses, although a 6–8 week interval is preferred between doses 2 and 3 and a 6-month interval is preferred between doses 3 and 4. Only 3 doses are needed when the third dose is given on or after the fourth birthday. Polio vaccine is not routinely recommended for those ≥ 18 years unless there is potential for exposure.

Polio Vaccine and Adults

Routine vaccination of persons ≥18 years of age residing in the U.S. is not necessary. However, polio vaccination is indicated for the following groups:

- Laboratory workers who handle poliovirus;
- Healthcare workers caring for polio patients;
- Persons traveling to regions of the world where polio is endemic or epidemic.

Polio Vaccination and Travel

In assessing the risk to a traveler for polio transmission, healthcare providers are urged to determine first if their patients will truly be traveling to a polio endemic or epidemic area, including Afghanistan, Cameroon, Nigeria, Pakistan and Somalia. Visit: www.cdc.gov/travel to obtain information on the risk of transmission of poliovirus in specific countries.

If travel to a polio-endemic or epidemic region is anticipated, please review the patient's history of polio immunization. Ninety percent or more of vaccine recipients develop protective immunity to all three poliovirus types after two doses, and at least 99% are immune following three doses.

- If the patient has received a complete primary series of ≥ 3 doses of polio vaccine, administer a booster dose of IPV. Remember, a single booster dose is all that is needed.
- If the patient is unimmunized or partially immunized, follow an accelerated schedule to complete as much of the series as possible before departure, as outlined in the table below:

Weeks Available	Accelerated IPV Schedule*
≥ 8 weeks	3 doses, given 4 weeks apart
4-7 weeks	2 doses, given 4 weeks apart
< 4 weeks	1 dose

*1st dose may be given as early as 6 weeks of age

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Polio can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

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