Poliomyelitis

Although polio has been eliminated in most countries, it remains a disease with the potential to re-merge when public health resources are limited. The current international campaign to eradicate polio has had successes but still faces ongoing challenges.

The Agent

Poliovirus infects the throat and intestines. Up to 95% of polio infections have no or minimal symptoms. Some cases have mild symptoms of fever, sore throat, headache, or vomiting. Rarely the virus has neurological manifestation. Infection of the spinal cord, affecting the anterior horn cells, results in acute asymmetric flaccid paralysis which may improve but is often permanent. Even less commonly, poliovirus infects the bulbar region of the brain stem resulting in aseptic meningitis or respiratory paralysis. These cases required respiratory support such as an “iron lung” or negative pressure ventilator.

Humans are the only reservoir for poliovirus, which can be spread through direct person-to-person contact but more commonly is transmitted through fecally contaminated water or food. Infected infants are particularly likely to be asymptomatic but shedding the virus in their feces, serving as a source of infection. Respiratory secretions can also spread the virus.

Naturally occurring or wild poliovirus has three serotypes (1, 2 and 3) that do not have cross-protective immunity. All three are able to cause paralysis. The development of vaccines to prevent poliomyelitis was widely hailed as a major public health advance. The Salk inactivated poliovirus vaccine first became available in 1955. The vaccine protects against paralytic disease but not intestinal infection with poliovirus. The Sabin oral vaccine using attenuated live virus was licensed in 1962 and prevents intestinal infection with poliovirus in addition to averting paralytic disease.
Infants shedding live virus in the feces after having received oral vaccine have been the source of exposure for susceptible adults giving child care, with transmission through the fecal-oral route. The most recent Washington cases included a state resident diagnosed in 1993 with vaccine-associated paralytic polio acquired from a recently-vaccinated child who remained asymptomatic. In 1997, the ACIP recommended routine use of inactivated (IPV) rather than oral polio vaccine in the United States to eliminate this risk. In 2000, an IPV-only vaccine schedule was implemented for this country.

**Epidemiology of Poliomyelitis**

Although minimally symptomatic intestinal infection likely occurred frequently, clinically apparent polio infection was rare in this country until standards of living improved sufficiently to provide safe drinking water to most children in the early 20th century. In the middle of that century, outbreaks occurred periodically, particularly in the summer. Control measures included isolation of cases and closure of public swimming pools.

In Washington State, polio has been a notifiable condition for almost a century. The reported incidence of polio peaked in 1952 with 1,320 cases (52.8/100,000 population) and 22 acute deaths. The last case of wild virus infection identified in Washington occurring in 1977. The United States declared that transmission of wild polio virus infection within the country ended in 1979 and the virus was declared eliminated from the western hemisphere in 1991. However, unvaccinated travelers going to endemic areas remain at risk for exposure to wild poliovirus.

A global effort to eliminate polio through vaccination has reduced the worldwide burden of the disease over 99% since 1998. Through the Global Polio Eradication Initiative, by the end of 2012 polio remained endemic only in Afghanistan, Nigeria, and Pakistan; these countries can reintroduce the disease to neighboring regions, particularly during times of conflict and refugee movement. Only certain districts of Afghanistan have persistent wild poliovirus. Nigeria is the only country where there are three strains of virus in circulation, two strains of wild poliovirus and one vaccine-derived strain. Similarly, Pakistan has poliovirus transmission in only certain districts. Population movement between Pakistan and Afghanistan results in reintroduction of polio between the two countries.
During 2013, Pakistan detected 16 pediatric infections with poliovirus. There have also been 160 cases of polio reported from Somalia since April 2013, 13 cases from Kenya, and one case from the Somali Region of Ethiopia. Eradication is difficult because of asymptomatic intestinal infections and excretion, particularly in infants; religious and cultural opposition to vaccination; and political instability interfering with vaccination programs.

Ongoing Surveillance

In addition to ascertainment of paralytic cases, one strategy is environmental surveillance. Systematically testing sewage samples for poliovirus can detect asymptomatic cases or confirm that the viruses are not circulating in a community. Such surveillance may be done in countries seeking polio elimination or by their neighbors at risk for reintroduction. During 2012, wild poliovirus was found in sewage samples from Cairo. Earlier this year, Israel detected wild poliovirus type 1 (WPV1) during routine sewage surveillance. Further testing found positive sewage samples from multiple sites in the country, from both south and central regions. Poliovirus was subsequently identified in stool samples from 27 healthy children and one adult during a stool sample survey. In response, Israel instituted a national immunization program targeting all children up to age nine years using oral polio vaccine. Environmental surveillance most recently found wild poliovirus in samples from Jerusalem.

Polio has been eliminated from large parts of the globe but can be easily reintroduced through a combination of international travel and remaining susceptible persons. Maintaining universal vaccination combined with aggressive response to ongoing outbreaks will assist with the public health goal of polio eradication.