

ID Snapshot

Is global eradication of poliomyelitis in sight?

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Which of the following statements regarding polio is not correct?

- The global incidence of polio has decreased by more than 99% in the last 25 years.
- All cases of poliovirus infection are at least partly symptomatic.
- The last reported case of indigenously transmitted wild-type poliovirus infection in the United States occurred in 1979 during an outbreak among unimmunized people and resulted in 10 paralytic cases.
- Only two cases of vaccine-associated paralytic polio (VAPP) have occurred in the United States since 2000.
- Polioviruses are enteroviruses and consist of serotypes 1, 2 and 3. Poliovirus is spread by fecal-oral and respiratory routes, but infection occurs only in humans.

Answer: b is not correct. Approximately 75% of poliovirus infections in susceptible children are asymptomatic. Non-specific illness with low-grade fever and sore throat occurs in about 25%, and aseptic meningitis occurs in 1% to 5% of infections. Asymmetric acute flaccid paralysis with areflexia occurs in less than 1% of infected persons.

Remarkable advances in global polio eradication have been made in the past 25 years. In 2012, the fewest number of confirmed polio cases caused by wild polioviruses from the fewest number of countries in recorded history were reported.

Only three countries — Nigeria, Pakistan and Afghanistan — have never eliminated wild virus transmission. As long as polio remains endemic in these countries, wild virus can be re-introduced into polio-free areas leading to outbreaks. In fact, viruses from one of these reservoir countries were re-introduced into Somalia this



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In the prevaccine era, few diseases caused more fear than poliomyelitis. Almost every summer, polio epidemics caused paralysis and death among children. The photo shows four young polio victims inside an iron lung. Polio's best-known victim, President Franklin Delano Roosevelt, formed the National Foundation for Infantile Paralysis in 1937. This became the March of Dimes and provided funding for the vaccines developed by Jonas Salk and Albert Sabin.

year, a country that had been wild virus polio free since 2007, leading to a major outbreak of paralytic disease. Thus, a top priority for eradication must be to eliminate wild polioviruses in these last remaining reservoirs.

A major obstacle is geopolitical instability. Polio has been eliminated in countries where vaccine administration programs are well-organized. Much of the credit for interrupting poliovirus transmission goes to volunteers who ensure that every child is immunized. The murder of vaccine health workers in 2012 and 2013 in Pakistan and Nigeria by terrorists presents a threat to reaching the final goal of polio eradication. Other potential problems include insufficient funding, inability to recruit vaccine workers and insufficient supply of appropriate vaccines.

Once wild viruses have been eradicated, several obstacles still must be overcome before polio can be eliminated. Unfortunately, live oral polio vaccine (OPV) viruses rarely cause paralysis. One cause is VAPP, which occurs very rarely in vaccine recipients or close contacts (about once per 2 million to 4 million doses).

Second, live vaccine strain poliovirus is shed for six to eight weeks from all vaccinated children. This attenuated strain spreads to others in the community, generating the desired effect of herd immunity. In under-immunized populations and especially in areas with inadequate sanitation,

the attenuated virus may continue to circulate for months or years. In time, the circulating vaccine-derived polio virus strain (cVDPV) may accumulate back-mutations or undergo recombination with non-polio enteroviruses to a more virulent strain that can cause severe disease, including paralysis.

The last naturally acquired, known case of type 2 poliovirus disease occurred in 1999. However, type 2 cVDPV strains continue to cause

disease. Since 2000, nearly 2.5 billion cases of polio are estimated to have been prevented by vaccination, but during this time 650 cases of cVDPV have occurred. Clearly, the public health benefit of live poliovirus vaccine far outweighs the small risk of cVDPV disease.

Another source of possible vaccine virus that can infect the population comes from a small number of asymptomatic persons with an immune deficiency disorder who receive live polio vaccine and are unable to mount an adequate immune response, and who may be unidentified. As a consequence, vaccine strain virus (immunodeficiency-related vaccine-derived polio virus) is excreted for a prolonged period from the gastrointestinal and upper respiratory tracts.

Thus, the final step in polio eradication will depend on withdrawal of the live oral vaccine. To provide assurance that polio does not return, administration of at least one dose of inactivated poliovirus vaccine will be necessary to maintain polio immunity in the population for at least five years after the eradication of wild polioviruses is certified and all use of OPV is stopped.

As of July, 140 confirmed cases of wild-type poliovirus have occurred in five countries (Afghanistan, Kenya, Nigeria, Pakistan

and Somalia). In addition, cVDPV has been isolated from 18 cases in six countries during the first six months of 2013. In 2013, all strains of cVDPV have been type 2. The Global Polio Eradication Initiative has targeted 2014 as the year for the last case of wild-type polio anywhere in the world.

Walter A. Orenstein, M.D., FAAP, a member of the AAP Committee on Infectious Diseases, offered the following comment, "The global eradication of polio will be a gift from our generation to all future generations who will never have to worry about being severely crippled by this terrible illness."



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