

The Challenge of Global Poliomyelitis Eradication



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KEYWORDS

- Poliomyelitis • Eradication • Oral poliovirus vaccine (OPV)
- Inactivated poliovirus vaccine (IPV)

KEY POINTS

- More than 99% of poliomyelitis cases are asymptomatic or consist of mild illness without paralysis. Acute Flaccid Paralysis (AFP), a sign of polio, is also a sign of many other diseases.
- Physicians should suspect polio in a clinically compatible case. There may not be a history of travel to a polio endemic/epidemic country as the person transmitting virus to the paralytic case could have had an asymptomatic infection or nonparalytic illness.
- A single case of paralytic polio demands immediate attention, including notification of the state health department and Centers for Disease Control and Prevention (CDC) and collection of stool samples for laboratory confirmation.
- Since 1988, the number of poliomyelitis cases has been reduced by more than 99%, yet reservoirs of disease remain. Barriers to eradication include insecurity, political commitment, and immunization system quality.
- US physicians play an important role in surveillance, vaccination, advocacy, and financial support for global eradication of polio.

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INTRODUCTION

Today, few Americans may remember the devastating implications and fear caused by poliomyelitis outbreaks given that there has not been an outbreak of paralytic polio in the United States since 1979. Before the development of effective vaccines, poliomyelitis was a seasonal epidemic disease in the United States. The number of cases peaked in 1952 when more than 20,000 cases of paralytic polio were reported.¹ Although some people recovered from paralytic polio, many suffered permanent paralysis and even death. Hospital wards filled with iron lungs and permanently disabled children served as painful visible reminders to society of the toll this debilitating disease took on young lives. With an estimated 350,000 polio cases worldwide and endemic disease in 125 countries the World Health Assembly launched the Global Polio Eradication Initiative (GPEI) in 1988, targeting the disease for eradication.

POLIO AS A CANDIDATE FOR ERADICATION

Global eradication is currently defined as, “the worldwide absence of a specific disease agent in nature as a result of deliberate control efforts that may be discontinued where the agent is judged no longer to present a significant risk from extrinsic sources.”² Determining if a disease is a good candidate for eradication depends on whether or not it meets 4 key criteria. These criteria include the following:

1. Humans are required to maintain the pathogen.
2. Sensitive and specific diagnostic tools are available.
3. There is an effective intervention to terminate human-to-human transmission.
4. There is proof of principle (ie, elimination of transmission in a large geographic area).

Poliovirus requires a specific cell receptor (PVR or CD155) for infection that is expressed only on human and simian cells.³ Therefore, humans are the only host for sustained poliovirus transmission as primate population sizes are too small to maintain sustained transmission. Breaking the chains of human-to-human transmission can eradicate the virus. Although asymptomatic cases present a challenge to surveillance, AFP reporting and virologic testing of stool are reliable ways to detect polio cases in populations. Although not without certain limitations, oral poliovirus vaccine (OPV) and inactivated poliovirus vaccine (IPV) are effective tools in preventing infection in individuals and reducing circulation of poliovirus within communities. With its low cost, ease of administration, and ability to induce mucosal immunity, OPV has been a particularly useful tool in interruption of transmission in populations. Lastly, early elimination of polio in the Western hemisphere served as proof of principle that eradication was possible throughout the world.

CLINICAL ASPECTS OF POLIO

Polioviruses, consisting of 3 antigenic types (serotypes 1, 2, and 3), are positive-sense single-stranded RNA Enteroviruses belonging to the Picornaviridae family.³ Most poliovirus infections occur after oral ingestion of the virus followed by replication in the oral and intestinal mucosa, and most infections are asymptomatic.³ In less than 1% of infections, the virus attacks the motor neurons of the anterior horn cells in the spinal cord, leading to destruction of those cells resulting in permanent paralysis of muscles. The most common cause of death from polio is respiratory insufficiency, when the infection affects respiratory muscles, occurring in about 5% to 10% of cases.^{3,4} There is absence of sensory abnormalities, although deep tendon reflexes

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