

Reflections on Another Pandemic

Gail Levine, MD

As we are faced with the Covid-19 pandemic, we reflect back to another pandemic disease with devastating consequences, fearful to the population, without treatment, and with the population looking hopefully towards the development of a vaccine.

Poliomyelitis infections have likely been with humankind since antiquity, as described in images and historical accounts. Polio was an endemic pathogen until the 1900s when the United States and Europe began to see epidemics. (1) Jakob Heine published the first medical article about polio in 1840. In 1890 Karl Oskar Medin was the first to study a poliomyelitis epidemic. The disease was, therefore, then called Heine-Medin disease. (2,3)

Before 1900, polio infections mostly occurred in children six months to four years of age. (4) Only mild symptoms generally resulted from infection in this age group and resulted in immunity. (5) Around the turn of the century, there were improvements in clean water and sewage disposal, and this younger age group had less exposure to poliovirus. Poliovirus exposure was thereby delayed until later childhood and adulthood. At these ages, we are more at risk for the paralytic form. (4)

“1952 brought the nation’s most severe epidemic, with over 57,000 cases, over 21,000 with mild to severe paralysis, and 3145 deaths. (7,8)”

Epidemics caused widespread fear, closure of movie theatres, and cancellation of meetings and public gatherings. Children were told not to drink from water fountains; pools were closed. People stayed home. (6) 1952 brought the nation’s most severe epidemic, with over 57,000 cases, over 21,000 with mild to severe paralysis, and 3145 deaths. (7,8)

John Enders, Thomas H. Weller, and Frederick C Robbins successfully cultured the poliovirus in human tissue and were awarded the Nobel Prize in 1954. (9) This work enabled the development of the Salk vaccine, the inactivated polio vaccine. Testing took place in 1954. Vaccine campaigns followed licensing, promoted by the March of Dimes. In the US, the annual number of cases fell from a peak of 58,000 cases to 5600 cases. (3) Albert Sabin developed the oral polio vaccine with an attenuated live virus. It was licensed in 1962. Mass immunization with this vaccine further reduced cases to 161 in 1961. (10)

Franklin D Roosevelt became paralyzed from the waist down by polio in 1921. In 1938 he helped to found the National Foundation for Infantile Paralysis, now known as the March of Dimes. The March of Dimes raised funds for rehabilitation of those with paralysis and contributed to funding the development and testing of

the polio vaccines. The March of Dimes transformed philanthropy by soliciting small donations from individuals rather than only large contributions from the wealthy. A dime in 1950 was equivalent to \$1.06 in 2020. (11)

Poliovirus is a human enterovirus C species, a single positive-strand RNA virus. (12) Poliovirus serotypes 1, 2, and 3 can all produce motor neuron disease. Most paralytic disease is due to Poliovirus 1. Wild poliovirus serotypes 2 and 3 no longer circulate. Pakistan and Afghanistan continue to report cases of wild poliovirus 1 poliomyelitis. (13)

Poliovirus is transmitted by fecal-oral spread, and in epidemics, by pharyngeal spread. (14) 90-95% of poliovirus infections are asymptomatic. In less than 10%, a minor illness known as abortive polio follows an incubation period of 4-10 days. It can include symptoms of common viral infections. In some, there is a symptom-free interval of a few days, followed by CNS involvement. There are meningitic symptoms and signs, which may be followed by the destruction of anterior horn cell motor neurons and motor weakness. Only 0.1% of poliovirus infections lead to paralysis. (15, 16)

Viral replication in spinal motor neurons leads to cell death and paralysis of the muscle tissue supplied by the motor neurons. Cranial nerve involvement can lead to dysphagia, and thoracic muscle involvement can lead to respiratory insufficiency. (17)

The polio pandemic led to advances in vaccine science and the transformation of philanthropy, as well as to developments in rehabilitation medicine. Many of its survivors became leaders in the disability rights movement.

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Philip Zweig, a friend of Neonatology Today, has shared with us his Polio Pioneer card. He took part in a trial of a polio vaccine in 1954. In 1954, this would have been the trial of the Salk inactivated polio vaccine.

THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS
CERTIFIES THAT

Philip Zweig

HAS BEEN ENROLLED AS A

POLIO PIONEER

and this certificate of membership is
hereby presented for taking part in the first national tests
of a trial polio vaccine conducted during 1954.

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Corresponding Author



Gail Levine, MD
Assistant Professor of Pediatrics
Loma Linda University School of Medicine
Division of Neonatology
Department of Pediatrics
Loma Linda, CA
Email: Levine, Gail <GLEvine@llu.edu>