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Comparing the Polio and Coronavirus Epidemics

Daniel J. Wilson, PhD, Professor of History Emeritus, Muhlenberg College, Allentown, Pennsylvania, dwilson@muhlenberg.edu



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In the early 1950s the most feared epidemic disease was polio, which every year paralyzed thousands of children and adults. In the midst of the coronavirus epidemic, it is useful to look back and compare the two epidemics.

Both epidemics are caused by viruses, but from different families. The novel coronavirus that caused the current pandemic—SARS-CoV-2—is a respiratory virus while poliovirus is an intestinal virus. The coronavirus damages the lungs. Poliovirus begins as an intestinal virus that in a small percentage of cases migrates into the spinal cord where it destroys motor nerves, causing paralysis. Scientists still don't know why this migration occasionally occurs.

According to the CDC, coronavirus is spread through respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. Spread is more likely when people are in close contact with one another (within about 6 feet). The poliovirus is shed

in the stools of infected individuals and acquired through drinking water or ingesting food contaminated by the stools. Polio is most frequently found in situations of poor sanitation. Unlike coronavirus, you can't acquire polio by simply being next to an infected person—you need to drink water or eat food contaminated by their stools.

SARS-CoV-2 is a novel virus, meaning it has not previously been identified. It appears to have originated in bats and jumped to humans someplace in China. Poliovirus is exclusively a human disease and has infected humans for thousands of years going back at least to the ancient Egyptians.

The victims of the two viruses are quite different. Paralytic polio affected primarily children and adolescents, although adults such as Franklin Roosevelt also

acquired it. Polio's original name, after all, was infantile paralysis. Coronavirus, like polio, can affect all ages, but it appears to be most serious and fatal in older adults and those with underlying medical conditions. Paralytic polio could be fatal if it affected the breathing muscles, but this was a small percentage of cases. More typically it left its victims with paralyzed legs and arms.

In both diseases a significant number of cases are inapparent, where the infected individual exhibits none of the typical symptoms but is capable of spreading the disease. Though we don't have a clear picture, the CDC has estimated that perhaps 25% of coronavirus infections are inapparent. In polio, over 90% of cases were inapparent and only 2–3% of infections resulted in permanent

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paralysis. In both epidemics, inapparent cases were a major source of new infections. When I had polio in 1955 at age five, I was the only one in the neighborhood with a diagnosed case of polio. I probably acquired the virus from someone with an inapparent case.

From 1900 to 1960 there were polio epidemics almost every summer somewhere in the United States, but they were local or regional, not national in scope. For example, if Philadelphia had a polio summer, Pittsburgh likely escaped. Although some states have been hit harder with the coronavirus, it is now present in all 50 states. Any economic impact of a polio epidemic was limited to the locality or regions where it occurred, and life could proceed normally in the rest of the country.

In addition, because polio primarily struck children, the wage earners in the house were generally spared and continued to work. Other than theaters and swimming pools, businesses were rarely closed in polio epidemics, which generally lasted only a few months at most. Many ended with the advent of colder weather. Thus, the economic impact of the polio epidemics was much less than coronavirus.

Just as hospitals have struggled to care for all those stricken with coronavirus, hospitals in the polio years could easily be overwhelmed in a major epidemic. Isolation hospitals were established, and parents were prohibited from visiting their sick children. The widely feared iron lungs were the first effective ventilators and saved many lives, but doctors sometimes had to make difficult decisions about which patients to put in the limited number of tank respirators.

We don't yet know what the long-range consequences of coronavirus will be. Will its victims suffer lingering health issues as a result of having been sick? Although most of those infected with poliovirus escaped long term consequences, that was not true for those who were paralyzed by the disease. The paralysis



Local residents line up in front of a grocery store in Columbus, Georgia, in 1961 during a polio immunization campaign.

Courtesy of CDC/Charles N. Farmer

was permanent in many cases, though rehabilitation could restore some function to affected muscles. And assistive devices such as braces, crutches and wheelchairs allowed others to function successfully, to get an education, find a job, marry and have children.

What finally ended the polio epidemics—and what will likely end this new epidemic—was the development of a vaccine. Two polio vaccines were developed: the killed virus Salk vaccine in 1955 and the live virus Sabin vaccine in the early 1960s. Both vaccines were developed with funding provided by the March of Dimes, a private philanthropy started by President Roosevelt.

While scientists rush to develop a coronavirus vaccine, the polio vaccine provides a caution. It took years for both Salk and Sabin to develop their vaccines. The successful test of the Salk vaccine in 1954–55 was cause for national celebration. However, a few weeks after its approval in 1955, a bad batch of the new Salk vaccine produced by Cutter Laboratories caused 200 cases of paralytic polio and ten deaths.

The Cutter Incident derailed the plans to quickly vaccinate the nation, though vaccination did safely resume a few weeks later. While we hope for the quick development of a coronavirus vaccine, care needs to be taken to avoid a repeat of the Cutter Incident.

Very different epidemics in different eras. I am confident, however, that just as medical research ended the long terrifying decades of the polio epidemics, scientific research will much more quickly develop effective treatments and a vaccine for coronavirus. ■