The US needs to prepare to introduce the novel oral polio vaccine

The US needs to plan for what happens if the inactivated polio vaccine and hygiene measures do not stop polio transmission, say Nina Schwalbe and Jay Varma

Nina Schwalbe, 1,2 Jay K Varma3

On 13 September 2022, the United States was added to a list compiled by the World Health Organization (WHO) of countries with circulating poliovirus, and joined a group that includes Somalia, Democratic Republic of Congo, and Yemen.1 In late July, the New York State Department of Health reported that a person had been paralysed as a result of a polio infection likely acquired in the US.2 This was the first case of domestically acquired infection in the US since 2005.3,4 Subsequently, the same variant of poliovirus was detected in sewage samples in several counties in New York, indicating that hundreds of thousands of people may have recently been infected.5 In early September, New York State’s governor declared a disaster in the state.

The stakes are high to get the public health response right. Although most poliovirus infections cause no or mild symptoms, the virus can cause meningitis (one to five cases in 100), irreversible paralysis (ranging from one in 200 to one in 2000 people infected depending on the virus type), and even death (between approximately two to 10 people in 100 paralysis cases).2–6 If the US wants to gain control of transmission and prepare for the worst, it needs to revise its polio vaccine programme and consider introducing the novel oral polio vaccine (nOPV) to its arsenal.

Polio in the US

For 40 years, the US, like much of the rest of the world, relied on an oral polio vaccine (OPV), which was routinely administered to children in the US until 1999.7 This vaccine is a weakened version of the virus, and stops people from getting infected, infecting others, and developing severe illness.8 It is also easier to administer than the inactivated version, which is injected. Through a combination of improved sanitation, which prevented people from passing infections to each other, and mass vaccination using the oral vaccine, the US managed to stop domestic transmission of wild polio in 1979.9 All of the Americas had done the same by 1994, and polio is close to eradication globally.10

In 2000, the US switched from using an OPV in its vaccine programme to only using an injected inactivated polio vaccine (IPV). The IPV produces antibodies that stop the virus from invading the nervous system, but it stimulates only limited immunity in the gastrointestinal system where people are first exposed to the virus.11 Consequently, it’s possible to be fully vaccinated and protected from the worst of polio, but to still “catch” the virus and spread it to others.

The US made this switch for two reasons. Firstly, when there is no endemic polio—as was the case in the US after wild polio was eradicated—the inactivated vaccine can give people the essential immunity they need to protect them against illness. Secondly, in very rare situations, the weakened virus in the oral vaccine can itself cause polio or mutate when passed between unvaccinated people into a strain that can cause paralysis.12 It was this strain of virus, which likely derived from the use of OPVs outside the US, that has been detected in New York.3

An uncertain strategy

Polio will continue to spread as long as there are people susceptible to infection and person-to-person transmission. So, now that the virus is circulating in New York, what should we do? State health officials are responding to the outbreak with a strategy that assumes inactivated vaccines combined with hygiene measures will eventually stop transmission.13 Yet we fear that this may not be enough. To end the cycle of infection, public health officials need to both protect people from paralysis and stop people from spreading the virus. Increasing the number of people who receive the IPV protects them from severe illness. But it will not stop the ongoing transmission of polio where it is already circulating, leaving people who are unvaccinated vulnerable. Statewide, 78% of children in New York have received three polio immunisations by the age of 2 years,14 but in some communities coverage is as low as 37%.15 With polioviruses now identified in 69 wastewater samples, we are concerned that public health officials cannot rely on hygiene to stop polio transmission in New York.15 In recent years, New York’s antiquated system for waste disposal has seen rubbish overflowing on the streets,16 and an aging water and sewage infrastructure has left some areas plagued by blocked sewers and unsafe drinking water.17,18 Extreme weather events have also increased the frequency with which rainfall overwhelms New York’s sewage systems, exposing people to untreated wastewater.19 Inadequate public sanitation and safe water services increase the likelihood that there may be neighbourhoods in which people could be exposed to poliovirus from contaminated surfaces or water.20

Planning ahead

The reality on the ground has clearly changed since 2000. This is why New York needs to be prepared to introduce the nOPV. Inexpensive and easy to administer, the nOPV produces a gut reaction that protects the individual from disease and stops transmission using a more stable version of OPV, which is much less likely to mutate and cause...
paralysis. Unfortunately, the US is not yet prepared to administer nOPV, despite helping to finance its development. Ample global data show the safety and effectiveness of this new vaccine, with 450 million doses already administered in more than 20 countries around the world. Yet the vaccine has not even been approved for use in the US.

The US should begin this approval process immediately and devise a strategy to define the triggers for using the nOPV—such as additional cases of severe disease or continuing detection in wastewater. Public health agencies should also start to devise how they would work with communities to explain the benefit of this type of polio vaccine. The US would also need to urgently invest in manufacturing scale-up so as not to cannibalise the existing and much needed global supply. A global stockpile of this vaccine is currently held by Unicef in Denmark, and while there may be enough vaccines to provide limited quantities to the US, any substantial draw would be at the direct expense of other countries with circulating polio. With proactive planning and investment, this risk can be managed.

We cannot underestimate the threat of polio and the need to stop both disease and transmission. That means planning for the potential use of nOPVs. As we saw with covid-19 vaccines, where there is a will for rapid registration and the upscaling of production capacity, there is a way. While we may not need nOPV in the US today, we must be ready with it in the arsenal as a “plan B.”

Competing interests: None declared. Nina Schwalbe has held senior leadership positions at Gavi, Unicef, and USAID. She is currently the principal at Spark Street Advisors. Jay Varma directs the Cornell Center for Pandemic Prevention and Response. He spent 20 years working on infectious diseases for the Global Polio Eradication Initiative for Pandemic Prevention and Response. He spent 20 years working on infectious diseases for the Global Polio Eradication Initiative.

Provenance and peer review: Not commissioned; not externally peer reviewed.

2 State NY. New York State Department of Health and Rockland County Department of Health Alert the Public to A Case of Polio In the County. 2022. https://health.ny.gov/press/releases/2022/2022-07-21_polio_rockland_county.htm
3 Centers for Disease Control and Prevention. Public health response to a case of paralytic polio in a vaccinated person. 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7136e2.htm
13 Basset MT. Even a single case of polio is a threat. https://www.nytimes.com/2022/08/21/opinion/even-a-single-case-of-polio-is-a-threat.html