No one is safe until everyone is safe—from polio too

The detection of polioviruses in the UK should remind us once again that viruses know no borders, write Ed Clarke and Beate Kampmann

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Polio used to be a devastating and much feared disease in the UK and across the world. Caused by the poliomyelitis virus, in the absence of vaccination, infection results in paralysis in around one in 200 and death in approximately 5-10% of these cases.1

Thanks to the introduction of safe and effective vaccines in the late 1950s and early 1960s, the condition has largely been forgotten as a public health concern in most high resource settings, including in the UK. Who knows about “iron lungs” these days? Indeed, after the establishment of the Global Polio Eradication Initiative (GPEI) in 1988, we have seemingly been on the verge of worldwide polio eradication for a decade or more.2 Africa was declared free of wild polio in August 2020 and only two small pockets of wild poliovirus type 1 remain, in Afghanistan and Pakistan.

However, polio returned to the wider consciousness in the UK last week with the detection of vaccine derived poliovirus type 2 (VDPV2) in sewage samples taken in north London.3 Vaccine derived polioviruses arise when genetic reversion events in the Sabin oral polio vaccine (OPV) increase their, otherwise attenuated, transmissibility and neurovirulence.4 While isolated cases of such viruses are detected during environmental surveillance of this kind every year, in this instance genetic sequencing showed evidence of virus evolution as well as the relatedness of the strains detected since February. This suggests ongoing excretion of the virus and the possibility that it is being transmitted from person to person. While the virus has not been isolated directly from an individual, and there have been no associated cases of acute flaccid paralysis reported, these are now clear possibilities. With immunisation rates in London as low as 86% on average and likely even lower in certain areas of the city, this leaves a pool of potentially susceptible individuals.

We should not be surprised by these findings. Between the start of 2021 and 21 June 2022, 24 countries around the world, including 19 in sub-Saharan Africa, reported VDPV2 associated with around 800 cases of acute flaccid paralysis.5 In 2003, the UK switched to using only the inactivated polio vaccine (IPV) in its routine immunisation schedules. Indeed, wild poliovirus type 2 was eradicated globally in 2015,6 and since April 2016, no OPV in use for routine immunisation around the world has contained the type 2 virus. Despite this, VDPV2 outbreaks have continued—a reflection of residual vaccine virus circulating in large populations.

While IPV effectively protects a vaccinated individual against paralytic disease and cannot itself lead to VDPV, it does not fully stop the virus being excreted in stools and hence circulating in the population if there is still virus around. For this reason, IPV cannot be used to control outbreaks when there is evidence of ongoing circulation of this kind. Somewhat counterintuitively, type 2 OPV campaigns have instead been conducted for outbreak control because of their greater ability to interrupt transmission, but have still ultimately driven further outbreaks—a vicious cycle ensuing. The VDPV2 detected in the UK is likely to be the result of such a campaign elsewhere and reminds us once again of our interconnected world. Indeed, further sequencing may provide insights on this. Viruses know no borders, as we know only too well.

So, why are we still using the oral vaccine when it can sometimes trigger vaccine-associated disease? This remains a question of perspective and alternatives. Here is the perspective: over the past 10 years—during which more than 10 billion doses of oral polio vaccine were given worldwide—circulating VDPV outbreaks remained rare.6 GPEI estimates that in the same period, without vaccination with OPV, more than 6.5 million children would have been paralysed by wild poliovirus.6

And here is another alternative: a novel type 2 OPV (nOPV2) has been genetically engineered to reduce the risk of the genetic reversion events associated with VDPV2. It is expected to control but not trigger outbreaks in the future and was the first vaccine to receive an emergency use listing by the World Health Organisation in November 2020 8 (before the covid-19 vaccines). The vaccine has already been used in nationwide vaccination campaigns across west Africa and elsewhere. We have recently completed the key phase 3 licensure trial of nOPV2 at the Medical Research Council Unit in The Gambia, the results of which are expected later this year.9 The vaccine is ultimately expected to replace all other type 2 OPV vaccines globally and, it is hoped, also resolve the ongoing detection of VDPV2. Despite recent challenges and the detection of VDPV2 in the UK, the goal of eradication remains within our grasp.

Polio vaccination is a story of success. When the GPEI started, polio paralysed around 1000 children daily worldwide. Since then, 2.5 billion children have been immunised across more than 200 countries, and rates of paralytic polio have decreased by 99%.10 Its 2022-26 strategy aims to complete the last steps on the route to zero cases.11

Going forward in the UK, enhanced environmental surveillance and sequencing of any isolated viruses remains crucial to provide further information on the extent of transmission and to guide the initiation of any additional, targeted public health measures.

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OPINION
needed. Critically, vaccination of anybody unvaccinated or incompletely vaccinated against polio, particularly in those areas in which the virus is circulating, should be tackled as a public health emergency, and resourced as such. All healthcare practitioners should remain vigilant for early signs of acute flaccid paralysis and rapidly refer patients on for both clinical care and public health assessment.

Finally, the detection of polioviruses in the UK should remind us once again that nobody is safe until everyone is safe. Sound familiar?

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9 Pan African Clinical Trials Registry. PACTR202010705577776.