



# The emergence of the circulating vaccine-derived poliovirus type 2 in multiple countries requires active surveillance: current scenario and counteracting strategies

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Dear Editor,

On 11 April 2022, a child less than 2 years old living in the Tamanrasset Province of South Algeria showed signs of acute flaccid paralysis (AFP). On 8 July 2022, this was notified by the WHO through the Global Polio Laboratory Network (GPLN) as a case of circulating vaccine-derived poliovirus type 2 (cVDPV2)<sup>[1]</sup>. In the past few months, several genetically linked Sabin-like type 2 poliovirus isolates have been detected numerous times in the USA and the UK<sup>[2]</sup>. Since last February, the GPLN in London has been consistently detecting Sabin-like type 2 isolates in sewage samples. The latter showed enough mutations to be classified as type 2 vaccine-derived poliovirus (VDPV2) and, due to the evidence of community transmission, were classified as cVDPV2<sup>[2]</sup>.

No human cases of VDPV2 have been documented in the UK as of 5 September 2022. Only one case of VDPV2 was reported in an unvaccinated paralytic individual. This was the first poliomyelitis case reported in that country since 2013 that was not linked to recent international travel. In the USA, the virus isolates detected in environmental samples were found to be genetically related to those reported in the sewage samples from London and those from Jerusalem, Israel<sup>[2]</sup>. In the case of the child who showed AFP in Algeria, the cVDPV2 isolates were detected in the stool samples. This was the first case of cVDPV2 in that country.

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Genome sequencing showed that the isolated virus was genetically related to one strain previously isolated in Kano, Nigeria. The child had not received the polio vaccine and had never travelled outside the Tamanrasset Province. Public health investigations are currently underway in that region to identify any more AFP cases<sup>[1]</sup>.

Poliomyelitis or polio is a highly infectious disease, caused by serotypes 1, 2 and 3 of the poliovirus, causing permanent paralysis and death (5–10% death among those paralysed). It usually affects children below 5 years of age<sup>[3]</sup>. The virus is transmitted through the faecal-oral pathway (e.g. contaminated food or water) or by shared transportation<sup>[1,2]</sup>. The incubation period commonly lasts between 7 and 10 days but can take up to 35 days. Around 90% of infected individuals present with mild symptoms that go undiagnosed. Some early symptoms of the disease are fever, nausea, exhaustion, headaches, limb pain and stiff neck. In few cases, the disease may result in paralysis that is generally permanent. The virus accumulates in microglia, polymorphonuclear neutrophils and plasma cells. Phagocytosis of infected cells by macrophages leads to axon degeneration and muscle atrophy which spreads widely resulting in flaccid paralysis. Bulbar involvement, respiratory and cardiovascular paralysis in severe cases usually results in death. Post-polio syndrome might develop 25–30 years after the first paralytic attack, resulting in progressive muscular atrophy possibly due to continuous degeneration of motor neurons<sup>[3]</sup>.

Polio has no known treatment and can only be avoided by getting vaccinated. Polio vaccine is derived from a poliovirus type that differs from the original oral polio vaccine strain vaccine which is rare. Communities not fully protected against polio may see an increase in the genetic alteration in oral polio vaccine strains in the gastrointestinal tract while replicating. The virus is prevalent, especially in overcrowded and poor sanitation and hygiene localities. As the infection spreads depending on the population immunity, other modifications could arise. The longer the virus survives and the more mutations it undergoes that much weaker shall be the population immunity.

The United Kingdom Health Security Agency (UKHSA) is conducting further investigations and gearing up response measures<sup>[2]</sup>. Strengthening the environmental, clinical and laboratory surveillance for polio and enhancing environmental sampling to assess the reach of the virus are suggested. An array of additional sewage/wastewater sampling sites is being erected where positive cases found across nations. Healthcare professionals need to be alerted to detect VDPV2 in newly registered children and adhere to routine immunisation in migrants, asylum

seekers and refugees. Increasing vaccination coverage and launching immunisation campaign to provide inactivated polio vaccine to residents that are potentially exposed to poliovirus is greatly suggested. Recently in August 2022, a supplementary inactivated polio vaccine booster campaign targeting children of 1–9 years was launched in London. A disaster emergency was declared in New York State, USA due to polio on 9 September 2022. Amplified global-scale active surveillance for acute flaccid myelitis and release of real time updates on the paralytic and nonparalytic polio cases are suggestible.

Although the wild poliovirus strains – 2 and – 3 (WPV2 and WPV3) have been eradicated globally, strain – 1 (WPV1) remains endemic to some countries such as Afghanistan and Pakistan. The recent reports on the emergence of cVDPV2 in multiple countries may place these vulnerable countries at greater risk and contribute to a global health threat<sup>[4,5]</sup>. It is possible for re-infections to occur due to the dissemination of poliovirus from vaccines, the import of poliovirus from a country with weak immunisation services or trade/travel links to countries where polio is endemic<sup>[6]</sup>. As countries with low levels of immunity/surveillance are at risk of polio resurgence, it is important that children in these countries are vaccinated and that disease surveillance is increased to guarantee a polio-free nation. As of 6 October 2022, a total of 33 countries have reported cVDPV2-positive cases either from human or environmental samples. This cVDPV2 outbreak is becoming a global concern as more annual cases have been registered since 2017 compared with WPV1<sup>[6]</sup>. In Malawi, increasing cases of WPV1 and cVDPV2 co-infections prompted the government to proclaim a national public health emergency. As WPV1 has a greater tendency to propagate compared with cVDPVs, a strong response to tackle both types of poliovirus strains is urgently required<sup>[7]</sup>.

Poliovirus was recognized as the second Public Health Emergency Of International Concern (PHEIC) on 5 May 2014 and still considered as such by the International Health Regulation (IHR) committee at its January 2020 meeting<sup>[8]</sup>. The polio IHR emergency committee held in June 2022 continued to recognize the high risk of poliovirus spreading internationally. The recent detection of cVDPV2 isolates in the USA and the UK suggest that countries that have eradicated polio are still at danger of re-infection or re-emergence. Therefore, it is important to update poliovirus response plans to detect and respond to this outbreak. Efforts should also be made to educate the population about vaccination. Although vaccination can be challenging in the context of the current global COVID-19 pandemic, ensuring adequate routine polio vaccine coverage to protect against both vaccine-derived and wild poliovirus strain is urgently needed to control the potential global risk posed by polio, and ultimately eradicate this disease<sup>[7]</sup>.

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## Author contribution

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## Conflicts of interest disclosure

The authors declare that they have no financial conflict of interest with regard to the content of this report.

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## Guarantor

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