

Endgame Polio: Role of Novel Oral Polio Vaccine Type 2

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ABSTRACT

Polio eradication efforts have seen major advances since 1988 when the thrust for eradication was initiated on a global level. The endgame polio strategy, as announced by the World Health Organization (WHO), is a program from 2019 to 2023 that attempts at the four-point target of eradication, integration, containment, and certification of polio that has ravaged the world across centuries. According to the latest available data, Pakistan has reported 11 cases of wild poliovirus type 1 (WPV1) in 2022, while Afghanistan reported four cases since the start of 2022. Mozambique reported one case of WPV1 in March 2022, while Malawi had one reported case in November 2021. Circulating vaccine-derived poliovirus (cVDPV) types 1, 2, and 3 have been reported from various parts of the globe, especially from the African continent. Active methods are needed to combat and mitigate the spread of PV, especially in the vulnerable and under-immunized regions of the world. The WHO has authorized the use of a novel oral polio vaccine (nOPV), which has been found to be more stable and not revert to neurovirulence when used in the community. These candidates' vaccine is being used in cases of outbreaks of cVDPV, with good results.

Keywords: Endgame polio, Infectious disease, Novel oral polio vaccine, Oral polio vaccine, Vaccination, Vaccines.

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INTRODUCTION

Polio eradication efforts have seen major advances since 1988 when the thrust for eradication was initiated on a global level. The polio endgame strategy, as announced by the WHO, is a program from 2019 to 2023 that attempts at the four-point target of eradication, integration, containment, and certification of polio that has ravaged the world across centuries.¹

Current Scenario

Globally, some countries continue to report cases of polio infection. While we would like to presume that wild virus infection has gone away, some countries continue to report cases caused by WPV1.

According to the latest available data, Pakistan has reported 11 cases of WPV1 in 2022, while Afghanistan reported four cases since the start of 2022.² Mozambique reported one case of WPV1 in March 2022, while Malawi had one reported case in November 2021.² This is indeed a disturbing trend.

Circulating vaccine-derived poliovirus types 1, 2, and 3 have been reported from various parts of the globe, especially from the African continent.

The Global Polio Eradication Initiative has been working towards the global eradication of polio. This is an organization spearheaded by national governments, WHO, Centers for Disease Control and Prevention, United Nations Children's Fund, and other bodies like Rotary International, etc. have been working toward the global eradication of polio.³ One of the innovative methods that were initiated is the use of nOPV.

Need for Innovation

Globally, cases of cVDPV have interfered with efforts at disease eradication.⁴ Most of these cases have been found to be caused by type 2 PV, and this is more rampant in regions with low vaccine coverage. This is linked to the reversion to neurovirulence of the vaccine virus, the circulation in some populations of the vaccine strains, and rarely due to the occurrence of vaccine-associated paralytic poliomyelitis in vaccinated children or their close contacts.⁴

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As an outbreak response, the monovalent OPV type 2 (mOPV2) has been used.⁴ However, the continued usage of this mOPV2 as an attempt to break the outbreaks in settings of poor immunization coverage is fraught with danger.⁵ This mOPV2 has an inherent tendency to lose its attenuating mutations and revert. Thus arose the need for a more genetically stable type 2 OPV, leading to the discovery of nOPV type 2 (nOPV2).^{4,5}

What is nOPV2?

As outbreaks of cVDPV type 2 (cVDPV2) continued to occur, the continued use of mOPV2 posed a challenge. Hence a novel vaccine, nOPV2 has been deployed for use as a method of mitigating the risks.⁴ Two nOPV2 candidates, designated as nOPV2 candidate 1 (c1) and nOPV2 candidate 2 (c2), have been developed.⁵ These are considered to be genetically more stable than the mOPV2.

The nOPV2 is considered a next-generation version of the mOPV2, which could help reduce the emergence of cVDPV2 in low immunity settings.⁶ This vaccine has been labeled as a tool to combat the outbreaks of cVDPV2 in various countries.⁶

The result of combined efforts of various research organizations under an umbrella consortium, combining different approaches of stabilization, and attenuation, resulted in the selection of two candidate nOPVs to undergo clinical development.⁷ These were designated as nOPV2-c1 and nOPV2-c2 vaccines.

Safety and Utility of nOPV Vaccine

The nOPV2 vaccine candidates are the attenuated serotype 2 PVs that are derived from the modified Sabin type 2 infectious complementary DNA clone.⁷ They have been processed to include S15 stabilization of the domain V in the untranslated region, which is one of the requirements to ensure non-reversion of the attenuation.

Extensive trials were conducted on both the nOPV2-c1 and the nOPV2-c2 vaccines. Randomized control trials were done in Belgium on adult patients between 18 and 50 years of age who had previously received OPV and inactivated PV vaccines. This study showed that both the novel vaccines were safe and immunogenic in previously immunized persons.⁵

After the issuance of the WHO Emergency Use Listing (EUL) in November 2020, the candidate vaccines have been rolled out for limited usage in countries that need to tackle vaccine-derived poliomyelitis cases.

Usage and Results

Under the EUL, the nOPV2 has been rolled out in countries that require tackling cVDPV2. It can be used as an outbreak response, especially in vulnerable and under-immunized populations.⁶ Despite the stringent safety and immunogenicity studies, the vaccine is being closely monitored in the field.⁸ In Africa alone, over 50 million doses of the nOPV2 vaccine have been administered in six countries, with no concerns about its safety.⁹ With over 65 million doses already administered globally, the safety and genetic stability data have been strengthened.⁶

The WHO Strategic Advisory Group of Experts has endorsed the transition to the use of nOPV2, which will be a stepping stone for countries to be verified faster for nOPV2 usage.⁶ This will indeed be a step in the right direction to contain cVDPV2 cases as well as move ahead toward global polio eradication.

CONCLUSION

As the world inches towards the target of the endgame polio strategy 2019–2023, cases of cVDPV continue to threaten the disruption

and interfere with the achievement of goals. The nOPV2 vaccine has proven its stability and non-reversion of its attenuation. It has so far proven to be an invaluable tool for containing the spread of cVDPV2, especially in the most vulnerable countries of the world. It is indeed a vaccine for the future to ensure a polio-free world.

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