Editorial

The Elephant's Tail of VAPP, VDPV in the Polio End Game

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Abstract

A lot have been achieved by the Global Polio Eradication Initiative since 1988 after World Health Assembly passed the resolution to eradicate polio. Today, we have decreased the global polio incidence by 99.9% since GPEIs started working. We still have to remove polio from the few leftover pockets and get rid of the final 0.1% of polio cases. We have gained in positive terms that an estimated 16 million people today are walking and more than 1.5 million are alive because of the stakeholders' strong, strategic and cooperative action. The journey to the last mile has some different difficulties and this article tries to provide additional insights into the strategies to achieve our goal of Polio eradication.

Keywords: Incidence, Goals, Poliomyelitis, Global Health, Walking.

Introduction

The Global Polio Eradication Initiative (GPEI) aims to complete the eradication and containment of all wild and vaccine-related polioviruses.[1] World is by now free only from wild poliovirus type 2 & 3 (WPV2 eradicated in 2015 and WPV3 eradicated in 2019). We still have to work harder for the remaining wild polio-virus 1 (WPV1), the vaccine-associated paralytic virus (VAPP) and vaccine-derived polioviruses (VDPVs), to reach "Every Last Child" to achieve a polio-free world. It would be appropriate to say that though the elephant is gone out, the tail (VAPP, VDPV & WPV1) is still here.

The GPEI Strategy 2022-2026 has identified the goals and formulated strategic objectives to achieve them. While the strategies to tackle the WPV are well known to all stakeholders, the newer technical approach to dealing with VDPV and VAPP must be disseminated. These half-identical acronyms VDPV & VAPP often confuse readers. Let's try to understand them by their origin, action and prevention required for the Polio end game as tabulated in the Table 1.

Hence both VAPP and VDPV originate from Sabin's oral polio vaccine (OPV), and the most important predisposing factor for such events is low vaccination rate in the community. One of the core components in the eradication Strategy is still to increase vaccine acceptance to end the wild poliovirus (WPV) transmission.[2] We also have to simultaneously handle the incidences of VDPV outbreaks to end all types of transmission, which is a bigger task from Public health aspect.

34th Polio Emergency Committee Meeting: Concern on cVDPV

The recent meeting under the International Health Regulations (2005) (IHR) on the international spread of poliovirus reviewed data on wild poliovirus (WPV1) and circulating vaccine-derived polioviruses (cVDPV). It reported only three genetic clusters of WPV1, a major reduction in the genetic diversity of WPV1, represented by one cluster in Pakistan, one in Afghanistan, and one in Africa. The most important concern regarding Circulating vaccine-derived poliovirus (cVDPV) was the ever-widening gap in population intestinal mucosal immunity in young children since the withdrawal of OPV2 in 2016.[3] After the Global eradication of WPV2, the OPV vaccines were switched from tOPV to bOPV, so the

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Definition	
Vaccine-associated paralytic polio (VAPP)	*Vaccine-derived poliovirus (VDPV)*
It is a rare event associated with OPV. Caused by a strain of poliovirus that has genetically changed in the intestine from the original attenuated vaccine strain contained in OPV and results in polio-like symptoms. [5] It is a one-time case, with no risk of spread to others. Occurs approximately 2 to 4 events per 1 million Vaccinations. It is an adverse event following Immunization (AEFI) of OPV. Their chance of occurrence increases many folds in presence of immunodeficiency and is referred as iVAPP	The oral poliovirus vaccine (OPV) contains a live, attenuated (weakened) vaccine-virus. This virus replicates in intestine and enters bloodstream, triggering a protective immune response. However, during this process, some virus may genetically mutate and become neuro-virulent (able to cause paralysis and circulate in communities) and is referred to as VDPVs [4,5] There are of three types:[6] **iVDPV**: - Immunodeficiency-associated from known or confirmed immunodeficiency cases. **cVDPV**: - Circulating, Evidence of circulation in community present. **aVDPV**: - Ambiguous, no evidence of circulation and from individuals with no known immunodeficiency
Occurrence	
VAPP is a rare event and cases have declined following the removal of the type 2 component in trivalent OPV in April 2016, which was responsible for approximately 40% of all VAPP cases.	VDPVs are more common than VAPP and cases are increasing because of the immunity gap after the switch (trivalent to bivalent OPV).
Risk factors	
High percentage of un-vaccinated children or low vaccination rates, Immune-compromised children	Low vaccination rates, poor sanitation, high population densities – all promote community spread through shredding
Community Spread	
It is a one-time case, with no risk of spread to others	Definite risk of community spread through shredding
Action	
VAPP cannot spread between individuals, so an outbreak response is not necessary. But this case should be monitored and followed (currently 60-day FUP is done).	Requires Outbreak Response and further workup to prevent spread [5] Vaccination of all children under five years of age with OPV to boost immunity. Environmental Surveillance to be strengthened
Prevention	
Use of Inactivated poliovirus vaccine (IPV) [7] will prevent any VAPP as vaccine has all 3 killed strains of the virus – NO disease even in immune-compromised.	Use of Inactivated poliovirus vaccine (IPV) [7] will prevent any VDPV as vaccine has all 3 killed strains of the virus – NO Mutation

intestinal immunity against type 2 virus is decreasing, which is the reason for increased cases of cVDPV2.

The Polio End Game

The cVDPVs are a key challenge in the final stage of eradication. The outbreaks can be stopped using the same proven tactics. The program will phase out by use of OPV after WPV transmission has been stopped. At that point, the inactivated polio vaccine (IPV) will be used to maintain population immunity levels.

The GPEI supports the rollout of type 2 novel OPV (nOPV2), a next-generation version of mOPV2.[8] The clinical and field trials have given positive reports.[9] It protects against type 2 Polio and is more genetically stable, decreasing the likelihood of cVDPV2 emergence in low immunity settings. nOPV2 has been used since March 2021 for outbreak response under WHO's Emergency Use Listing Procedure (EUL).[10] As of October 2022, 500 million doses of nOPV2 have been administered in 23 countries.[11] Data on the vaccine's safety, immunogenicity and genetic stability is continuously being collected to reach the ultimate goal of WHO prequalification and full licensure. We are all hopeful and committed to reach the "EVERY LAST CHILD".[12] Let's keep our support high, in all possible way for the good of Humanity.

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