OPINION EDITORIAL

Why is Polio Still Around?

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Poliovirus is an enterovirus and is the causative agent of poliomyelitis; an acute paralytic disease that results in asymmetric persisting weakness (i.e. acute flaccid paralysis). In 1988, the spread of the virus resulted in 350,000 cases of poliomyelitis and 125 polio-endemic countries [1]. Due to these events, the World Health Organization (WHO) formed the Global Polio Eradication Initiative (GPEI) with the main purpose of eradicating polio through vaccination [2]. Since its launch, GPEI has failed to meet five deadlines to eradicate polio (i.e., 2000, 2005, 2012, 2014, 2018) and has spent over $20 billion USD [3,4]. Through a series of challenges and failures, the initiative now faces a new reality where the vaccine itself is linked to more cases of polio than the wild-type poliovirus [5]. This article will re-evaluate the progress of the GPEI, as well as outline the challenges that it has faced.

Two vaccines are commonly used to prevent polio: an oral polio vaccine (OPV) and an inactivated polio vaccine (IPV). Each vaccine is comprised of three common strains of the wild poliovirus – Sabin strains type 1, type 2, and type 3. The main difference between OPV and IPV is that the former contains the live attenuated poliovirus, whereas the latter contains the killed virus [2]. Previously, the main vaccine used in the GPEI initiative was OPV because of its affordability, ease of administration, and effective induction of intestinal immunity [6]. However, the downside to OPV is that it can recover the neurovirulence and transmissibility of a wild-type virus, termed circulating vaccine-derived polioviruses (cVDPV) [2].

To stop these cVDPVs, the GPEI asked that all countries using the trivalent-OPV (tOPV) switch to the bivalent-OPV (bOPV), as it only contains polio types 1 and 3. The removal of polio type 2 from OPV was well-supported given that the wild-type poliovirus type 2 had not been detected since 1999 [7,8]. However, following this switch, 25 cVDPV-type 2 (cVDPV-2) outbreaks occurred in 13 countries between January 2018 and June 2019 with the target population being children born after the switch (Figure 1) [5].

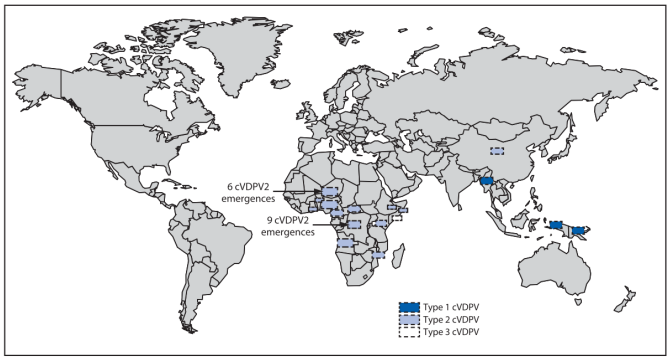

Figure 1. Map of circulating vaccine-derived poliovirus (cVDPV) outbreaks types 1, 2, and 3 from Jan 2018 – Jan 2019 [5].

Neglect of research into improving OPV has at least partially contributed to the current cVDPV outbreaks. In 2000, one of the first cVDPV outbreaks was reported in the Dominican Republic. Researchers confirmed 13 cases of vaccine-associated paralytic poliomyelitis (VAPP) that were linked to cVDPV-type 1 [9]. To many researchers, the emergence of these cVDPV outbreaks was perhaps unsurprising given the few attenuating mutations that prevented the vaccine strains from recovering (i.e. six attenuating mutations in OPV strain type 1, two in OPV strain 2, and three in OPV strain 3) [7]. However, such neglect continued on for 50 years and only now are researchers (funded by the Gates Foundation) developing a stable form of

OPV. A possible reason as to why such neglect occurred may be due to its rarity and remoteness from developed countries, contributing to a lack of awareness and thus efforts to address the issue [10,17].

Before the OPV switch, the WHO Strategy Advisory Groups of Experts on Immunization recommended that all countries using tOPV incorporate at least one dose of IPV into their routine immunization programs by 2015 [11]. The purpose of using IPV is to provide enough protection to impede the spread of polio type 2, in the event that it makes a comeback. However, two years after the switch, 28% of countries have yet to include IPV into their routine immunization programs. This may have occurred for two reasons; 1) overoptimistic planning and a lack of communication, as there were undiscussed supply and production setbacks, and 2) a lack of national support into programs aimed at disease control, as only one-third of countries worldwide are developing outbreak programs that meet the standards of the International Health Regulation [12,13].

Furthermore, eradication has been argued to be the wrong approach for combating polio. When eradication of a virus is declared, it refers to the absence in detection of the virus over a 3-year period. Unlike viruses that have been eradicated like small pox, polioviruses can be carried asymptomatically [14]. Thus, failure to detect polio does not guarantee its complete eradication if one considers the silent nature of polio and its capacity to regain pathogenicity and transmissibility (i.e., cVDPV-2). For this reason, many researchers argued that GPEI should have taken on a control approach and focused their effects on routine immunization and diagnostic programs to ensure sustained immunity and reduced polio transmission among children in endemic regions [3,15].

Neglect of different political cultures has also contributed to the failures in the fight against polio. In 2003, when the immunization campaign came to Nigeria, political leaders in Northern Nigeria claimed that 'the West' contaminated the polio vaccines. with antifertility agents to 'fight the Muslims' [16]. The spread of these rumours were fuelled by a political interest to destabilize the running Southern political parties who supported mass vaccination. This propagated a boycott against the immunization campaign that lasted for 15 months and continues to have consequences as Nigeria, which is yet to be polio free [16].

Moving forward, the GPEI's next major challenge is to re-evaluate its sustainability. For 30 years, the program has relied on international funds to drive its agenda of eliminating polio with a "once-and-for-all" mentality. Without any sustainable plan to achieve the broader health security, its laboratory infrastructures are threatened because of public distrust and decreased funding. Thus, it may be important that future campaigns by the GPEI consider implementing interventions to improve the health literacy of the populations that they are administering vaccines, so to increase public trust. In addition, they may find it useful to engage in reflexive practice strategies, so to learn why shortcomings in previous circumstances have come about.

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