Challenges en route to polio eradication

The Global Polio Eradication Initiative (GPEI) has set a new target of 2026.[1] Since the original target of 2000 was missed, GPEI has consumed US$1 billion each year.[2]

Two fundamental errors have debased the GPEI. First, the GPEI assumed, without evidence, that in low-income countries, the predominant route of transmission of wild polioviruses (WPVs) was faecal–oral, despite every epidemiological clue supporting respiratory transmission. In the pre-eradication era, polio infections began in infancy during exclusive breastfeeding, with a median age of infection of 15 months.[3] WPVs' basic reproduction number (R_0) was 40–45,[4] making faecal–oral transmission implausible, whereas the R_0 of measles was 30 (with a median age of infection of 24 months).[4,5] Polio was therefore more contagious than measles, and it was confined to children younger than 6 years, whereas measles often spilled over to children aged 6–10 years.[5] Water-borne polio outbreaks have never been reported.

During the past two decades there have been innumerable importations of WPV type 1 from endemic countries to polio-free locations. Adults, themselves immune but prone to reinfections, were the travelling transmission vectors. In endemic communities, presumably adults and children acted as transmission vectors.

The role of oral poliovirus vaccines (OPVs) was to rapidly reduce WPV transmission, preparing for a final assault with inactivated poliovirus vaccine (IPV), which induces better pharyngeal immunity to interrupt respiratory transmission than OPVs.

GPEI's second error was to continue using vaccine viruses (which occasionally caused polio) beyond their epidemiological need. According to WHO, the most common cause of vaccine-associated paralytic polio (VAPP) in vaccinated children is the type 3 virus, and the most common cause in unvaccinated contacts of vaccinated children is the type 2 virus.[6] WPV type 2 was eradicated in October, 1999,[7] so use of the type 2 vaccine should have ended in November, 2002.[7] Continuation of the type 2 vaccine until April, 2016, resulted in unknown numbers of VAPP cases and many outbreaks caused by circulating vaccine-derived poliovirus (cVDPV) type 2, beginning in 2006.[8] Today, very high priority must be given to interrupting the transmission of cVDPV type 2 in over 20 countries.

Type 3 vaccine virus should have been removed by the end of 2015, 3 years after WPV type 3 was last detected in November, 2012.[8] The consequences of continuing the type 3 vaccine include unknown numbers of VAPP cases and the recent cVDPV type 3 polio outbreak in Israel.[9]

The best course of action for GPEI is to work with the Expanded Programme on Immunisation (EPI) to promote IPV (three doses per child), and to withdraw OPV from countries that reach 85% coverage in children younger than 5 years. Providing IPV through the EPI in Afghanistan and Pakistan will prevent WPV type 1 and cVDPV type 2 polio. The same tactic will prevent polio anywhere, caused by cVDPV types 1, 2, or 3.

We declare no competing interests.

Published Online
July 11, 2022
https://doi.org/10.1016/S0140-6736(22)01274-0

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