

Review Article

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Poliomyelitis Post-Eradication Issues: Time to Finish

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Abstract

Poliomyelitis is an acute enteroviral disease which can result in Acute Flaccid Paralysis in infants and children. Two highly efficacious and safe vaccines are available for prevention of Polio. The 41st World Health Assembly adopted universal resolution to eradicate polio by 2000. This led to the launch of Global Polio Eradication Initiative (GPEI). Through Routine Immunization and Supplementary immunization Activity (SIA), number of polio cases reduced by 99%, between 1988 to 2013. Four WHO Regions have been certified as polio free. Development of Vaccine-derived Poliovirus from use of attenuated Oral Polio Vaccine halted the progress of polio eradication. The other challenge is importation of Wild Poliovirus due to International travel. The "Emergency Committee" of WHO under International Health Regulation (2005) considered this spread of Polio as Public Health Emergency of International Concern (PHEIC) and formulated certain guidelines for the respective countries. The end phase of Polio eradication needs focused and vigorous effort from all sectors.

Keywords: Poliomyelitis; VDPV; International Travel.

Introduction

Historically, Poliomyelitis dates back to 14th century BC in Egypt [1]. Global efforts have been made to eradicate Poliomyelitis from the world. National Governments, WHO and many International and National Organizations joined hands to achieve a goal which could save billions of dollars and millions of lives. In last two decades we have almost reached to the finishing line. India has been listed among

certified successful nations. However seven countries have been listed by WHO, where OPV certification is mandatory for complete eradication [2]. The article highlights the timeline, challenges and International efforts being taken to reach the historical milestone in Public Health.

Timeline for Poliomyelitis

The first Inactivated Polio Vaccine (IPV) was licensed in 1955. Afterwards live attenuated (Sabin) vaccine, monovalent and the trivalent Oral Polio Vaccine (OPV) was licensed in 1961 and 1963, respectively.

The 41st World Health Assembly adopted universal resolution to eradicate polio by 2000. It followed the foundation for "Global Polio Eradication Initiative (GPEI)". It was a collaborative effort between various National Governments, World Health Organization (WHO), Rotary International, US Centre for Disease Control and Prevention (CDC) and partners including Bill and Melinda Gates Foundation, etc. After launch of GPEI number of polio cases reduced by 99% i.e., cases decreased from 3, 50,000 in 1988 to only 416 cases in 2013. In 2014 only three countries remained with Wild PolioVirus (WPV) transmission and they are Pakistan, Afghanistan and Nigeria. After 2012, no Polio case has been reported from Nigeria [3,4].

America was the first WHO region to be certified as Polio free in 1994. Then the other two WHO regions i.e., the Asia Pacific and the Europe became Polio free in year 2000 and 2002, respectively. In Jan, 2011 the last polio case was detected in India and in Feb, 2012 India was removed from the WHO list of countries with persistent WPV circulation. In 27th March 2014 WHO South-East Asia region was declared free of Polio. In 1999, type 2 WPV was eradicated from world and since 2012 no case of WPV 3 was seen [5,6].

In 2007, Advisory Committee on Polio Eradication (ACPE) recommended monovalent P1 & P3 or bivalent P1P3 in Supplementary Immunization Activities (SIAs) instead of trivalent OPV (tOPV). The immunogenicity was higher in mono and bivalent vaccine, as the interference exerted by P2 was removed [7]. In 2013 Polio Eradication and Endgame Strategic Plan 2013-2018 has been developed in view of significant risk of failure in eradication activities. The new plan was adopted in Global Vaccine Summit in Abu Dhabi, UAE. The aim was to eradicate all polio cases both Wild and Vaccine Derived Polio Virus (VDPV) [8].

Challenges

Re-emergence of Polio epidemic in previously Polio free countries due to International travel

In recent years some cases of paralytic poliomyelitis cases are seen in previously Polio free countries. The "Emergency Committee" convened by Director General of WHO, under International Health Regulation on 28th April 2014, reported that international spread of Polio to date in 2014 is an "extraordinary event" and is considered as Public Health Emergency of International Concern (PHEIC) [9]. It was seen that 60% of total polio cases is due to International travel. Majority of the cases were contributed by adult travellers. In year 2013, out of 416 total cases, 160 were reported in endemic countries and rest occurred in previously Polio free areas due to International travel.

The result of further spread is serious. There are certain Polio free countries where the routine immunization services have been compromised due to continuous civil war and political unrest. If Polio virus enters these countries due to international travel then it will be difficult to gain back the previous Polio free status. Over and above this situation will affect the entire world. If one child becomes infected then it could result in as many as 2, 00,000 new cases every year. Hence all countries of the world remain at threat till complete cessation of virus transmission [3,5].

WHO has categorised countries in to (a) States currently exporting WPV (Pakistan, Cameroon, and the Syrian Arab Republic) and (b) States infected with wild poliovirus but not currently exporting (Afghanistan, Equatorial Guinea, Ethiopia, Iraq, Israel, Somalia and Nigeria). The Emergency Committee has recommended following measures should be adopted by countries currently exporting WPV.

1. Officially declare at the level of head of the state that the interruption of poliovirus transmission is a national public health emergency.
2. All residents and long term visitors (> 4 weeks) should receive a dose of OPV / IPV 4 weeks to 12 months prior to International travel.
3. Travellers urgently going out (< 4 weeks) and unimmunized, will receive a dose of OPV by the time of departure.
4. All such International travellers should possess International Certificate of Vaccination and Prophylaxis (ICVP).
5. These criteria should be in place till (a) at least 6 months have passed without any exportation, (b) documentation of high quality Polio eradication activity being undertaken in these countries [10].

Measures taken by India

In response to the possible import of WPV, the Ministry of Health & Family Welfare, Govt. of India has adopted WHO recommendations. It is mandatory that all travellers going out or coming from seven Polio endemic countries should receive one dose of OPV. They should receive one dose of OPV at least 4 weeks prior to departure to India, irrespective of age and immunization status. The International Certificate for Prophylaxis against Polio is a must before applying for entry VISA in to India. Govt. of India, has updated the list of Polio endemic countries. They are:

1. Polio endemic countries: Pakistan, Afghanistan, Nigeria.
2. Countries with Polio virus circulation after importation: Kenya, Syria, Somalia and Ethiopia [11].

Emergence of Vaccine-derived Polio Virus

The OPV is very safe and effective vaccine. This live attenuated vaccine on rare occasions can mutate into circulating vaccine-derived poliovirus (cVDPV). It can cause paralysis and death of the host and has the ability to spread to others causing epidemic. Low immunization rates, poor hygiene and high population density are the main reason for cVDPV [12,13]. Type 2 strain is responsible for 80% cVDPV cases. Total 9 cases have been detected in the African Region between Jan to July 2015.

Strategies to decrease development of cVDPV are:

1. Maintaining a high coverage of Polio vaccination

through Routine Immunization (RI) activities.

2. Short term: Switching from trivalent to bivalent OPV as Type 2 strain is responsible for majority cVDPV. Introducing IPV which will boost immunity and prevent development of cVDPV when OPV is simultaneously administered.
3. Long term: Cessation of OPV use and continued IPV use after WPV transmission has stopped [14].

Approach in Future

Both OPV and IPV are safe and efficacious and both have got distinct role to end polio from earth. OPV is essential for eradication measures and IPV is required to eliminate the risk of cVDPV. As part of the Polio Eradication Endgame, all countries will stop OPV use and transition to IPV. With support from the GPEI and Global Alliance for Vaccine and Immunization (Gavi), the remaining OPV using countries will introduce at least one dose of IPV into their routine immunization programs by the end of 2015 [14,15].

Sequential Schedule of vaccination will be followed in RI. Initially from only OPV to OPV and IPV combined schedules will be taken up. One to two doses of IPV followed by equal doses of OPV will be provided. Combined schedule reduces chances of cVDPV and provides high intestinal immunity. At the end the combined schedule will be replaced by only IPV. IPV will stop all cases of VDPV and VAPP. Thus further transmission will be stopped and the world will achieve the Polio eradication status. India will introduce IPV in RI in last quarter of 2015 and will switch from trivalent (tOPV) to bivalent (bOPV) by early 2016 [16].

Now at the crossroads of Polio eradication, we need to consolidate gains by maintaining 100% immunization with Polio vaccine preferably IPV. Adults also need a booster with IPV to ensure victory over Polio. Eradication of Polio will benefit the world by saving US \$ 40-50 billion over next 20 years. The benefit is more in developing countries. It was estimated that 10 million people are now walking who would otherwise have affected by Polio in absence of vaccines.

Conclusion

Till date four WHO Regions have been certified as polio free where 90% of global population reside. The final leap to achieve polio eradication seems

difficult and extended, but it needs focused effort from all stakeholders. Intensified SIAs are required to remove Wild Poliovirus from the remotest corners of the last endemic countries and it should be supported by robust surveillance throughout the world to detect traces of Polio infection [2]. Countries should follow the WHO guidelines regarding Polio vaccination during International travel to prevent re-establishment of infection in Polio Free states. OPV should be phased out and IPV should take precedence in countries already achieved Polio eradication status. World as a nation will win the battle against this crippling disability.

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