

Polio eradication in India: The journey so far

Vinod Kumar, Pardeep Khanna and Garima Shivhare
Department of Community Medicine
Pt. B.D. Sharma PGIMS, Rohtak, Haryana

Mukesh Nagar
Senior Resident
AIIMS, Delhi

Pooja
Medical Officer
HCMS

Poonam Rani
Psychologist
Rohtak

In 1985, there were estimated 2 lakh polio cases in the country in the wake of which polio vaccine was universalized and integrated in the universal immunization programme for administration across the country. In 1995, when pulse polio programme was launched, there were still an estimated 50,000 polio cases in the country. In 2005, the NPSP conducted independent verification of VE using field epidemiology, for the first time, and re-discovered that 3 doses of t OPV provided protection to no more than 30% of children against WPV types 1 and 3.

Keywords: polio eraication, immunization programme

Pulse Polio Immunization had in the beginning enjoyed enormous popularity as a people's programme. The accelerated pace of vaccination, notwithstanding its success, had sown the seeds of fatigue. Intensified Pulse Polio Immunization: It marked as a shift from a people's programme to one run by professionals. Polio Resurgence has been observed to have a pattern of four years cycle. 1st resurgence occurred in year 1998, 2nd in year 2002 and 3rd was in year 2006.

The current situation of polio: There are three countries with endemic transmission till September, 2012; Afghanistan (18 Polio Cases), Nigeria (90 Polio Cases) and Pakistan (37 Polio Cases). Across Africa, 10 of the 15 previously polio-free countries re-infected in 2009 have successfully stopped their outbreaks.

The Global Push toward the Finish Line: While no polio cases have been detected in India for more than a year, poliovirus transmission is ongoing in the other three endemic countries Afghanistan, Nigeria, and Pakistan. Global Polio Eradication Initiative's (GPEI) Independent Monitoring Board considers Nigeria and Pakistan to be the greatest challenges for eradicating polio.

Background

In 1985, there were estimated 2 lakh polio cases in the country in the wake of which polio vaccine was universalized and integrated in the universal immunization programme for administration across the country. In 1995, when pulse polio programme was launched, there were still an estimated 50,000 polio cases in the country.

India's official representative at the 1988 World Health Assembly committed to the elimination of WPVs by 2000 and we expected that UIP would achieve it on time.

In 1995, when it became clear that this was unlikely to happen, the WHO stepped in and created a new special vehicle called the National Polio Surveillance Project (NPSP) and polio was placed under epidemiological monitoring through detection and virological investigation of all cases of acute flaccid paralysis.

No other childhood disease targeted for control under UIP is being epidemiologically monitored. During the 1970s and 1980s, studies had shown that tOPV had low vaccine efficacy (VE) in India and incomplete safety globally.

On the other hand, inactivated poliovirus vaccine (IPV) had a superior VE in India and complete safety globally. However, on

account of a health system flaw, a restrictive policy of the exclusive use of t OPV was continued and the government declined to license IPV. This official stand was mistaken by some global public health agencies to mean that Indian studies on VE of t OPV were not credible. Thus, a cycle was created in which the WHO and the government reinforced each other's flawed policy of exclusive use of t OPV. The Indian Council of Medical Research did undertake such an investigation and confirmed the low VE, but that was also ignored.

In the absence of case-based disease surveillance, which is an integral function of a public health department, vaccine-failure polio was missed for decades. This shortcoming was recognized by the NPSP only after attempts at elimination of WPVs failed beyond 2004. In 2005, the NPSP conducted independent verification of VE using field epidemiology, for the first time, and re-discovered that 3 doses of t OPV provided protection to no more than 30% of children against WPV types 1 and 3. In summary, the major factor that led to India's failure with polio elimination was the lack of an overarching Department of Public Health and the lack of technical leadership at the highest levels of policy-making. As in the case of similar departments in other fields, the Department of Public Health must also be headed by a technically qualified professional.

History

The People's Programme: Pulse Polio Immunization

Pulse Polio Immunization had in the beginning enjoyed enormous popularity as a people's programme, unleashing an immense spirit of volunteerism that brought the prevention of a communicable disease beyond the realm of public health. Large numbers of volunteers, including teachers, students, religious leaders, medical practitioners, community leaders, housewives, came forward with the Programme's inception in December 1995. They manned over 700,000 vaccination booths, talked to families, made public appeals and organized students' rallies. It also introduced a series of five Sub-National Immunization Days (SNID) with intensive vaccination of children in eight states where cases of paralytic polio were reported: Assam, Bihar, Gujarat, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal, And the activity was renamed Intensified Pulse Polio Immunization (IPPI).

The OPV conundrum

The accelerated pace of vaccination, notwithstanding its success, had sown the seeds of fatigue. Various questions dominated the mind of the public. They were anxious about the need of repeated doses,

doing it round after round, year after year and the reason of polio infection even after so many vaccinations. But for epidemiologists, the 0.7% children left unvaccinated meant yet more rounds of campaign to vaccinate all 151 million children again.

Eradication strategy was rocket science to most

The practice of open defecation and faecal contamination of drinking water easily precipitated viruses' transmissions. Children's vulnerability to infections and diarrhoea somehow reduced the efficiency of each dose of OPV in fighting the poliovirus. More than three doses were thus required for developing countries, delivered through the NID, a supplementary immunization activity to bring additional dosage to children, including newborns. For India, where 80% of its rural population had no toilet at home, the Ministry of Health and Family Welfare recommended eight to ten doses for each child.

OPV Coverage

From people to professional: Intensified Pulse Polio Immunization
The new policy effectively changed the nature of the programme. It discouraged many people from participating, especially teachers, who had to work on weekdays. Volunteers began to drop out. The average number of people manning each booth plunged from an average of 10 to 14 since 1995 - 1996 to 2.9 by 1999 - 2003. A core of paid workers, essentially public health employees took over the work, each receiving the additional allowance of Rs 50 per day.

It marked a shift from a people's programme to one run by professionals, essentially Auxiliary Nurse and Midwives (ANMs) and health workers, who were routine vaccinators from the health system.

The joint approach had enabled the system to locate and vaccinate millions more of "missing children", resulting in a drastic reduction of paralytic cases from 1,126 to 265 by the end of 2000. But the decline had not hit bottom zero which in epidemiological terms, signified successful interruption of the virus' transmission. India, along with 19 other polio endemic countries, had to look to their new target: 2002 in order to attain polio-free certification in 2005, a goal apart from that of the World Summit for Children. The 2005 goal was established by the World Health Assembly's Global Commission for the Certification of the Eradication of Poliomyelitis in 1996.

The resurgence of polio in 2002

Resurgence of polio cases in 2002 can be explained by the decline in OPV3 coverage in critical areas, allowing the accumulation of a large susceptible cohort of newborns. Hundreds of thousands of children were missed in areas with high population density, a very large birth cohort and poor sanitation which favor poliovirus transmission. Other reasons for non-compliance have been apprehension of side effects, unawareness of necessity for repeated doses, Social barriers like caste, gender, "purdah" system etc., lack of faith in 'government activity' and lack of motivation among workers to carry out house-to-house mop-up rounds.

Distribution of polio cases was found in the "Hot 4" of UP, 2000 August 2002, Moradabad, Badaun, Rampur, and Bareilly, .

What has gone wrong?

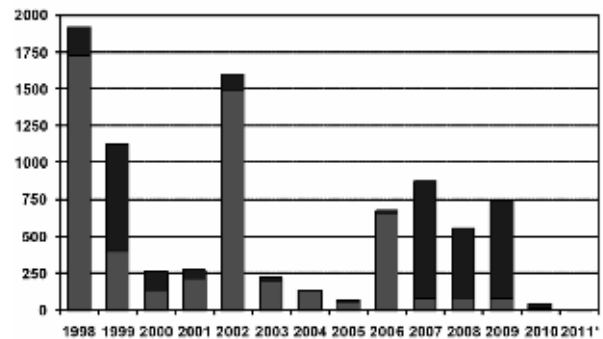
Firstly there was very low routine immunization. Secondly the high prevalence of non polio entero-viruses and abysmally poor

environmental sanitation making OPV less effective thereby requiring at least 10 doses of OPV in these areas to achieve sero-positivity in 97% of individuals. Thirdly there was resistance among Muslim Community. Fourthly there was lack of political and administrative will. Fifthly pockets of un-immunized children were found which were allowing continued circulation of WPV.

Four year cycle of polio resurgence

Polio Resurgence has been observed to have a pattern of four years cycle. 1st resurgence occurred in year 1998, 2nd in year 2002 and 3rd was in year 2006

Table 1: Showing Polio cases over the years in India



The only case of polio reported this year has been from Howrah district in West Bengal on 13th January 2011 as compared to 39 cases in January 2010.

For the first time no case of polio has been reported from UP (since April 2010) and also from Bihar (since September 2010). No case of type 3 polio has come up for about two years. Closest ever to eradicating polio, the Ministry of Health and Family Welfare, Government of India has decided to treat any fresh case of polio as a "public health emergency" in order to achieve polio eradication from India at the earliest. An Emergency Preparedness and Response Plan has been drawn up to intensify measures to build the immunity of children in all high risk areas and also to conduct intensive immunization campaigns rapidly in response to any polio cases if they occurred.

The current situation of polio

Seven countries have persistent polio transmission. Three countries with endemic transmission in year 2012 till September; Afghanistan (18 Polio Cases), Nigeria (90 Polio Cases) and Pakistan (37 Polio Cases) and three countries with 're-established' transmission; Angola, Chad and DR Congo.

Polio eradication sits at a critical juncture. Across Africa, 10 of the 15 previously polio-free countries re-infected in 2009 have successfully stopped their outbreaks. Key endemic countries are witnessing historic gains against the disease. Nowhere is progress more evident than Nigeria, where case numbers have plummeted by more than 99% from 312 cases at this time last year, to three in 2010. In India, for the first time ever, even the remaining endemic states of Bihar and Uttar Pradesh have not reported any wild poliovirus cases concurrently for more a year.

The new plan builds on major lessons learnt to date, including findings from a major independent evaluation examining the remaining barriers to eradication. It introduces district- and area-specific strategies to target the ever-shrinking remaining reservoirs

of poliovirus, exploits the game-changing bivalent oral polio vaccine to increase the impact of immunizations, and tackles health system weaknesses. The success of this plan now hinges on implementation of activities at field level and the provision of adequate financing. This has been successfully achieved.

Polio Cases due to Vaccine-Associated Paralytic Poliomyelitis (VAPP)

The continued use of OPV will result in a predictable burden of polio disease due to VAPP. VAPP cases will continue to occur at a rate of 2-4 cases per one million birth cohort wherever OPV is used. The OPV utilization patterns continued, so between 250 and 500 new VAPP cases occurred worldwide each year.

While the risk of polio due to wild poliovirus currently outweighs the risk of VAPP in most countries, this balance will change with global confirmation of the interruption of wild poliovirus transmission.

Polio Outbreaks due to circulating Vaccine-Derived Polioviruses (cVDPV)

The continued use of OPV will result in a predictable rate of polio outbreaks due to cVDPVs. Since 2000, four polio outbreaks due to cVDPVs have been documented in Hispaniola (in 2000-2001), the Philippines (in 2001), Madagascar (in 2002) and China (in 2004), resulting in a total of 31 polio cases. A fifth outbreak was described retrospectively in Egypt. Unlike smallpox, the eventual cessation of OPV must be synchronized across all countries so that the risk of cVDPV decreases rapidly and uniformly throughout the world, thus ensuring that no country is placed at risk of importing a cVDPV from an area where OPV use continues.

Medium and long-term risks of poliovirus re-introduction

The greatest risks to a polio-free world will be the inadvertent reintroduction of a wild, vaccine-derived or Sabin strain of poliovirus from a polio vaccine manufacturing site, a research facility or a diagnostic laboratory. This risk will diminish further as all countries fully implement appropriate bio-containment of polioviruses and verify that achievement.

Risk management before, during and after OPV cessation: implementing the prerequisites for OPV cessation. There are six prerequisites for simultaneous OPV cessation:

- Confirmation of interruption of wild poliovirus transmission globally
- Appropriate biocontainment of all polioviruses
- International stockpile of monovalent OPV (mOPV)
- Highly-sensitive surveillance for circulating polioviruses

- Procedure for internationally simultaneous OPV cessation
- Long-term routine polio immunization policy (i.e. national IPV decisions)

The Global Push toward the Finish Line

On February 25, 2012, WHO removed India, one of the four remaining endemic countries, from the list of countries considered to have never interrupted the transmission of wild poliovirus. India has not had a case of polio since January 13, 2011 and no recent environmental samples have detected wild poliovirus. Activities continue in India to secure the gains achieved. Large-scale polio vaccination campaigns are ongoing and active surveillance for acute flaccid paralysis (AFP) cases continues. Ongoing reports of suspected AFP cases from India will not be unexpected or unusual. In fact, identification of suspected AFP cases means disease surveillance is working and enables India to quickly test cases to rule out polio as the cause.

While no polio cases have been detected in India for more than a year, poliovirus transmission is ongoing in the other three endemic countries Afghanistan, Nigeria, and Pakistan. Global Polio Eradication Initiative's (GPEI) Independent Monitoring Board considers Nigeria and Pakistan to be the greatest challenges for eradicating polio.

It is therefore imperative that we make this final push toward eradication one of our highest priorities. As CDC Director, Thomas R. Frieden, MD, MPH, has stated, "If we fail to get over the finish line, we will need to continue expensive control measures for the indefinite future...More importantly, without eradication, a resurgence of polio could paralyze more than 200,000 children worldwide every year within a decade." Now is the time we must succeed for sure.

References

- Contraindications and special considerations. In Salisbury, D., Ramsay, M., Noakes, K. (Eds), *Immunisation against infectious disease* 2006. The Stationary Office, London. Ch 6. [Accessed 08 March 2012]. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_079917
- Global Polio Eradication Initiative. Polio this week As of 25 September 2012. 25 September 2012. [Accessed 28 September 2012]. Available at: <http://www.polioeradication.org/Dataandmonitoring/Poliothisweek.aspx>
- Global Polio Eradication Initiative. Three to go...It's official: India is no longer polio-endemic, leaving just three countries which have never stopped polio. 01 March 2012. [Accessed 08 March 2012]. Available at: <http://www.polioeradication.org/tabid/461/iid/201/Default.aspx>
- World Health Organization. WHO recommended surveillance standard of poliomyelitis. 2012. [Accessed 08 March 2012]. Available at: http://www.who.int/immunization_monitoring/diseases/poliomyelitis_surveillance/en/index.html