Global Polio Eradication: Progress and Prospects

ACIP Meeting
February 26-27, 2020
Polio Eradication and Endgame Strategy

1. Poliovirus detection & interruption

2. OPV2 withdrawal, IPV introduction, immunization system strengthening

3. Containment & Global Certification

4. Transition Planning
GLOBAL UPDATE

Distribution of Wild Poliovirus 2019

3 POLIO ENDEMIC COUNTRIES

Last Polio Case in India (2011)

Last type 2 polio in the world (1999)

Type 2 Eradicated (2015)

Type 3 Eradicated (2019)
Annual Number of Polio Cases Averted Globally, 1988-2019

- Total Number of Polio Cases Averted: 18.7 Million

Source: WHO/CDC
WPV3 Eradication Certified

We, the members of the Global Commission for the Certification of Poliomyelitis Eradication, conclude today, 17 October 2019, that

indigenous wild poliovirus type 3 has been eradicated worldwide.

Professor David Salisbury, Chair
WHO European Region

Professor Yegoutil Al-Musrou
WHO Eastern Mediterranean Region

Professor Rasha Laike
WHO African Region

Professor Mahmoud Mohanna
WHO South-East Asian Region

Dr Afaneh King
WHO Region of the Americas

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WHO Western Pacific Region

Geneva, Switzerland
The “good” news

• 7+ years have passed without detection of wild poliovirus type 3
  • GCC certified WPV3 eradication on 17 October 2019

• The number of inaccessible children in formerly Boko Haram controlled areas in Borno State, Nigeria, has been drastically reduced

• 3+ years have passed with detection of any wild poliovirus in Africa, and African Regional Certification Commission will convene in June 2020 to determine regional certification

• IPV supplies are now sufficient for routine immunization, and catch-up of missed cohorts is in progress

• EURO, PAHO, SEARO remain polio-free (incl. cVDPV2)

• Gavi (the Vaccine Alliance) has joined GPEI
Global WPV1 & cVDPV Cases\(^1\), Previous 6 Months\(^2\)

**WPV1 cases (latest onset)**
- Afghanistan: 15 cases (latest onset: 07-Dec-19)
- Pakistan: 110 cases (latest onset: 02-Feb-20)

**cVDPV1 cases (latest onset)**
- Philippines: 2 cases (latest onset: 28-Oct-19)
- Malaysia: 3 cases (latest onset: 12-Dec-19)
- Myanmar: 3 cases (latest onset: 09-Aug-19)

**cVDPV2 cases (latest onset)**
- Angola: 104 cases (latest onset: 27-Dec-19)
- Benin: 6 cases (latest onset: 06-Nov-19)
- Burkina Faso: 1 case (latest onset: 30-Nov-19)
- CAR: 15 cases (latest onset: 10-Dec-19)
- Chad: 3 cases (latest onset: 28-Oct-19)
- DRC: 55 cases (latest onset: 05-Dec-19)
- Ethiopia: 12 cases (latest onset: 05-Jan-20)
- Ghana: 14 cases (latest onset: 06-Jan-20)
- Nigeria: 4 cases (latest onset: 01-Jan-20)
- Pakistan: 24 cases (latest onset: 12-Jan-20)
- Philippines: 13 cases (latest onset: 15-Jan-20)
- Togo: 7 cases (latest onset: 20-Dec-19)
- Zambia: 1 case (latest onset: 25-Nov-19)

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\(^1\)Excludes viruses detected from environmental surveillance


Data in WHO HQ as of 18 Feb. 2020
The “bad” news

• Wild type 1 cases increased from 33 cases in 2018 to 173 cases in 2019

• The Taliban ban on house-to-house vaccination in Afghanistan is severely affecting the ability of the program to carry out campaigns

• In Pakistan, a new government is starting to provide national leadership – but >6 months passed in 2nd half of 2019 without large-scale vaccination campaigns and wild polio cases surged

• AFRO, EMRO and WPRO battle outbreaks of type 2 circulating vaccine-derived poliovirus (cVDPV2)
Polioviruses Can Rarely Regain Ability to Cause Paralysis

- Polioviruses in trivalent OPV are attenuated wild polioviruses (WPVs)
- Attenuation results in:
  - Markedly less ability to cause paralysis than WPV
  - Less capacity to pass from person to person than WPV
  - Similar induction of antibodies as WPV
- OPV polioviruses in areas with low polio vaccine coverage can rarely mutate during prolonged circulation and become vaccine-derived polioviruses (VDPVs) able to spread and cause paralysis (circulating VDPVs, cVDPV)
Preventing Circulating Type 2 Vaccine-Derived Polioviruses

- 700 paralytic cases due to type 2 cVPDV polioviruses confirmed during 2001-2015
- Prompted strategic decision to withdraw OPV2 use in all routine and supplementary immunization activities
Globally Coordinated Switch from tOPV to bOPV in 2016

Wild poliovirus type 2 last isolated in 1999, certified eradicated in 2015

155 countries switch in April 2016
Why Introduce IPV?

• IPV complements tOPV by increasing immunity to all three types of polioviruses, prepares for withdrawal of all OPV

• After the switch:
  • IPV will provide protection against paralysis from type 2 polioviruses (in those reached and who seroconvert)
  • In previous OPV2 recipients, IPV will boost intestinal immunity to infections with type 2 polioviruses
  • Strategic use of IPV in response to type 2 poliovirus outbreaks alongside monovalent OPV 2 (mOPV2) will increase population protection from paralysis
In 2016, fewer cVDPVs than in over a decade

as of 10 February 2017
(current numbers: http://www.polioeradication.org/Dataandmonitoring/Poliothisweek.aspx)
In 2019, the Number of cVDPV2 Cases and Infected Countries Sharply Increased

Number of cVDPV2 cases and infected countries, 2009-2019

Number of cVDPV2 outbreaks, 2016-2019

- Number of outbreak (ongoing and new)
cVDPV2 outbreaks

• Several outbreaks have been terminated after successful implementation of at least two mOPV2 rounds

• However:
  – To stop outbreaks, many responses required ≥4 rounds
  – Many new emergences are occurring across the African region due to low quality responses with mOPV2
  – Increasingly, outbreaks are occurring in areas where mOPV2 has not been used

• Caused by:
  – Decreasing population mucosal immunity since OPV2 withdrawn in 2016
  – Population movement
More “bad” news
An evolving new challenge

• The program is battling many outbreaks of cVDPV2 in Sub-Saharan Africa → and at risk of re-establishing poliovirus type 2 endemicity in Africa

• Detection of cVDPV2 outbreaks in Asia (China, Pakistan and the Philippines) may herald a global emerging problem

• Limited supply in global mOPV2 stockpile requires balancing use with availability of new shipments
‘The switch’ was supposed to be a major step toward eradicating polio. Now it’s a quandary

By HELEN BRANSWELL @HelenBranswell / SEPTEMBER 13, 2019

Three years ago, the leaders of the international campaign to eradicate polio pulled off a landmark feat, phasing out a problematic component of the vaccine used in developing countries, and introducing a newer version that they hoped would put the world on a better footing to finally eliminate a global scourge.

Now, some organizers are weighing whether “the switch,” as the process was known, needs to be reversed.

If it’s not, some fear, the world could face a heightened risk of spread of the disease, currently confined to its last redoubt, Pakistan and Afghanistan.
Way forward -- cVDPV2

• Prevent cVDPV2 spread into new geographies
  • Rapid deployment of mOPV2
  • Revised strategy guidance for control of cVDPV2 finalized in January 2020
  • Increase scope and quality of mOPV2 SIAs with surge in technical support
• Accelerate development & regulatory review & use of novel OPV2 → Emergency Use Listing (EUL)
What is novel OPV2 (nOPV2)?

- nOPV2 is a **genetic modification of the existing OPV type 2**
- The modifications made are designed to improve genetic stability of OPV
- This will in turn decrease the risk of seeding new cVDPVs and the risk of VAPP when deployed for cVDPV2 outbreak response

Figure 1: Modifications in nOPV2 Candidates

Sabin 2 genome is depicted showing the 5' untranslated region (UTR) in grey shading, polyproteins (P1-3), 3' UTR and polyA; locations of modifications within the genome are shown. Nucleotide differences between Sabin 2 and S15 domain V are shown in red.
Accelerating Regulatory Approval through EUL

- Owner: WHO Essential Medicine Department (EMP, PQ)
- Goal: make “experimental” health products available for emergency response
- Products listed under EUL so far: 0
- Eligibility criteria nOPV2: poliovirus spread is a Public Health Emergency of International Concern (PHEIC)
- Fastest way to obtain regulatory review and approval
Ramp-up of nOPV2 Clinical Development and Production to Align with EUL Approval

Feb 2020 EUL Submission
- Immunogenicity and safety: all ages
- Shedding: adults and 1-5 year olds
- Genetic stability: adults
- CMC pilot scale facility

Mar 2020 EUL Submission*
- Genetic stability: 1-5 year olds

July 2020 EUL Submission
- Updated stability data
- CMC commercial scale facility

WHO Review (3 mo.*)
- Mar 2020: 4-8M doses released & available for use upon EUL approval -- pilot plant
- Aug 2020: 100M doses released & available for use -- commercial plant
- Before end-2020: add'l 100M doses released & available for use -- commercial plant

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• Polio eradication made some progress in 2019, but encountered serious challenges
• Wild poliovirus eradication requires access in Afghanistan and vaccination quality improvements/accountability in Pakistan
• cVDPV2 outbreaks threaten the success of “switch” and may lead to re-establishment of type 2 endemicty
• mOPV2 needs to be replaced as soon as feasible by genetically more stable novel OPV2
• A 2nd dose of IPV in Routine Immunization is under discussion when supplies allow
• Securing the funds to run the program is a very high priority
Thank you