

Summary of the Response Strategy to Type 2 Poliovirus in the Post OPV2 Cessation Period

INTRODUCTION

Detection of poliovirus type 2, whether Sabin, vaccine-derived or wild strain, following cessation of oral polio vaccine type 2 (OPV2), requires a rapid response. In April 2013, SAGE recommended that GPEI work on the prerequisites for OPV2 withdrawal, including drafting a protocol to facilitate prompt detection of a type-2 poliovirus from environmental sources or circulating in the population, post-cessation use of live attenuated type-2 poliovirus vaccines and a rapid outbreak response.

This document summarizes the main elements of the strategy to respond to detection of type 2 poliovirus following global cessation of OPV2.

Post-cessation type II virus response strategy

The basic objectives of the response would be:

1. Prompt detection and notification of all type 2 poliovirus strains;
2. Rapid cessation of poliovirus circulation
3. Limiting exposure of populations to Sabin 2 poliovirus from mOPV 2 used in the outbreak response to prevent emergence of a new cVDPV type 2
4. Validating the absence of poliovirus type 2 in the population and the environment following the outbreak response.
5. Using established mOPV2 and IPV stockpiles for outbreak response under a strict release protocol endorsed by WHA.

The response strategy will comprise the following 5 major components:

- **Detection:**

Sensitive surveillance will be vital for the programme to rapidly detect any circulating poliovirus and initiate an immediate response.

Acute flaccid paralysis (AFP) surveillance will remain the primary mechanism for the detection of poliovirus after OPV2 withdrawal. AFP systems are likely to remain strong until global certification (2018).

In addition, environmental surveillance will be further scaled up as a complement to AFP surveillance for detecting the presence of poliovirus in infected areas and populations. This will facilitate the more rapid identification of outbreaks in high-risk areas, provide additional information to validate the interruption of transmission and help document the elimination of vaccine-related strains after OPV cessation. Recent persistent circulation of wild poliovirus in Israel¹ suggests that WPV transmission can be sustained for several months without being detected in areas with high IPV coverage and local factors that facilitate transmission (e.g., hygiene, temperature, living conditions). This underscores the importance of strengthening environmental surveillance, especially in areas at high risk for cVDPV emergence (e.g., low routine coverage and historical cVDPV cases), and areas where there is risk of silent

¹ Anis E, Kopel E, Singer SR, et al. Insidious reintroduction of wild poliovirus into Israel, 2013. Euro Surveill 2013 Sep 19;18(38):pii=20586

transmission and circulation of poliovirus, including areas in close proximity to vaccine production facilities.

After an outbreak has been stopped, all enhanced surveillance activities will need to be maintained for a minimum of 12 months following the last virus detection.

- **Notification:**

After withdrawal of OPV2, detection of any type-2 poliovirus (Sabin, vaccine-derived, or wild) will be an urgent notifiable event under the IHR. Notification will trigger an immediate assessment and decision regarding the outbreak response. According to the regulation, any detection of poliovirus type-2 (wild, vaccine-derived or Sabin) in any sample of any provenance should be notified after global cessation of OPV2.

- **Response:** the type and extent of response will be determined by 1) the time since OPV2 withdrawal, 2) the nature of the virus (e.g. wild vs. Sabin virus), 3) geographic location and proximity to high risk communities with immunity gaps and 4) the population characteristics (e.g., underserved, mobile, conflict-affected, history of virus importation).

The scale of the response will be determined by the amount of time passed since OPV2 withdrawal and location (see annex 1). These characteristics will determine the size of the target population and the age of the target population.

- **The time after OPV2 withdrawal** is important because it is known that mucosal immunity starts to wane 2-3 years after oral polio immunization²³. While the risk of outbreak declines over time, immunity of the population will also decline after the OPV2 withdrawal (young infants will not have the same level of intestinal immunity to type 2, despite IPV vaccination and older children's intestinal immunity will wane). Therefore, the longer the elapsed time since OPV2 cessation, the larger the scale of response will need to be.
- **The location of outbreak** will influence the scale of response. Countries with a high risk of poliovirus circulation and importation, such as those with a clear history of sustained WPV and cVDPV transmission ("Zone 1"), or those with consistently low immunization coverage or a history of WPV or cVDPV importation ("Zone 2") will mandate larger responses.

The outbreak response should utilize both mOPV2 and IPV vaccination to rapidly boost and establish population immunity around the outbreak response zone to prevent the emergence of cVDPV.

The use of mOPV2 is needed to induce the intestinal immunity among those who have not been vaccinated against type-2 previously. Recent studies have confirmed that IPV can rapidly induce serological immunity⁴⁵ and boost intestinal immunity in children previously

² Grassly NC, Jafari H, Bahl S, et al. Waning intestinal immunity following vaccination with oral poliovirus vaccines in India. *J Infect Dis.* 2012; 205: 1554-1561.

³ Estivariz CF, Jafari H, Sutter RW, et al. Immunogenicity of supplemental doses of poliovirus vaccine for children aged 6-9 months in Moradabad, India: a community-based, randomised controlled trial. *Lancet Infect Dis.* 2012 Feb;12(2):128-35

⁴ Moriniere BJ, van Loon FP, Rhodes PH, et al. Immunogenicity of a supplemental dose of oral versus inactivated poliovirus vaccine. *Lancet.* 1993 Jun 19;341(8860):1545-50.

⁵ Hanlon P, Hanlon L, Marsh V, et al. Serological comparisons of approaches to polio vaccination in the Gambia. *Lancet.* 1987 Apr 4;1(8536):800-1.

vaccinated with OPV. Therefore, in an outbreak response, IPV will be important adjunct to OPV in limiting transmission.

- **Travelers:**

Humans are the only reservoir for polioviruses. Therefore, travel and migration patterns have significant impact on the risk and the extent of poliovirus circulation. During a type-2 outbreak, therefore, travel in and out of infected areas will need to be restricted to the largest degree possible; people undertaking essential travel in or out of an infected area should be vaccinated to prevent further spread of poliovirus. Especially, vaccination of travelers out of the infected area with IPV is critical for the risk they pose to the new population.

- **Stockpile**

GPEI is establishing a 500 million dose stockpile of mOPV2 to be available specifically for outbreak response after OPV2 withdrawal. Use of the stockpile will be regulated by an established release protocol which will be endorsed by the WHA. The release protocol will include criteria and procedures for release of the stockpile (e.g., decision by DG WHO on advice by an expert panel within 48 hours of assessment and recommendation).

The mOPV2 stockpile will be complemented by an IPV stockpile to facilitate population immunity in infected and surrounding areas and to provide an alternative to mOPV2 as appropriate.

After OPV2 withdrawal, most OPV suppliers are expected to cease the production of Sabin 2 virus due to the stringent containment requirements for Sabin type 2 and absence of constant demand, so the potential for requesting Sabin-IPV production sites to produce extra mOPV2 stockpile should be explored.

Next steps

After the discussion at the November 2013 SAGE, GPEI proposes to develop this into a full response protocol for review by the SAGE WG and SAGE in 2014.

Annex 1: Matrix for WPV/cVDPV response after OPV2 cessation (Preliminary Draft)*

	Zone 1	Zone 2	Zone 3
Phase 1 (within 3 years of OPV2 withdrawal)	<ul style="list-style-type: none"> - Target population (TP) dependent on time & situation - Age group up to 10 years if needed 	<ul style="list-style-type: none"> - TP dependent on situation - Age group up to 5 yrs minimum 	<ul style="list-style-type: none"> - TP dependent on situation - Age group dependent on situation
Phase 2 (within 3-5 years of OPV2 withdrawal)	<ul style="list-style-type: none"> - TP minimum 1 million - Age group up to 10 years minimum 	<ul style="list-style-type: none"> - TP dependent on time & situation - Age group up to 10 years if needed 	<ul style="list-style-type: none"> - TP dependent on situation - Age group dependent on situation
Phase 3 (after 5 years of OPV2 withdrawal)	<ul style="list-style-type: none"> - TP minimum several millions - Age group up to 15 yrs minimum - Min 5 rounds with mOPV2 (monovalent type-2 Oral Polio Vaccine) 	<ul style="list-style-type: none"> - TP minimum 1 million - Age group up to 10 years minimum 	<ul style="list-style-type: none"> - TP minimum 1 million - Age group up to 10 years minimum

Zone 1: Countries/areas with a clear history of sustained transmission of wild poliovirus or the development of circulating vaccine derived poliovirus

Zone 2: Countries/areas with consistently low immunization coverage or history of importation of WPV or cVDPV type 1 or 3

Zone 3: Countries/areas with consistently higher coverage and few risk factors for sustained transmission of poliovirus

* Specifics will be further discussed at WG and finalized for April 2014 SAGE