Efforts and Progress Towards Polio Elimination in the Americas and the World

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Introduction

Polio Disease

Poliomyelitis is a life-threatening communicable disease, resulting in Acute Flaccid Paralysis (AFP), difficulty breathing and sometimes death. It is caused by the poliomyelitis virus, an enterovirus from the Picornaviridae virus family, which is subdivided into three serotypes: 1, 2, and 3.[1]

Humans are the only reservoir of polio disease. The predominant transmission mode of this disease in developing countries is the fecal/oral route. The virus replicates in the intestines and is excreted in feces. From the gastrointestinal system, the virus enters the bloodstream, eventually finding its way to the central nervous system. One week after onset there is less virus in the throat, but virus continues to be excreted in the stool for several weeks. If sanitation conditions and personal hygiene are inadequate, others can be infected from improper hygiene or contaminated water and food. Intestinal immunity is important in order to reduce or eliminate polio virus replication and excretion and thus prevent transmission.

Polio disease can strike at any age, but it mainly affects children under five years old who have not been vaccinated. Up to 72% of all polio infections in children are asymptomatic, but such individuals still shed poliovirus in the stool which can be transmitted to others for weeks. Approximately 24% of polio infections in children consist of a minor, nonspecific illness without neurological manifestations, with complete recovery within a week. Less than 1% of polio infections in children result in flaccid paralysis. Paralytic symptoms generally begin 1 to 18 days after prodromal symptoms and progress for 2 to 3 days. The illness progresses to flaccid paralysis, usually asymmetrical, with diminished deep tendon reflexes. Patients do not experience sensory losses or changes in cognition. Most people with paralytic poliomyelitis never recover completely, having residual paralysis of varying severity for the rest of their lives. Weakness or paralysis still present 12 months after onset is usually permanent.

Poliovirus may be isolated from the stool, less likely from the pharynx, and only rarely from cerebrospinal fluid (CSF) or blood. After virus isolation, further tests need to be conducted using polymerase chain reaction (PCR) or genomic sequencing, to determine if the virus is wild type, vaccine-derived poliovirus (VDPV) or Sabin (see below).

Until 1988, the global burden of paralytic poliomyelitis was estimated to be over 350,000 cases per year, with wild poliovirus (WPV) transmission reported in more than 125 countries. Since 1988, sustained use of polio vaccines worldwide has led to a precipitous drop in the global incidence of poliomyelitis by over 99%. The number of countries with endemic polio dropped from 125 to just three in 2016, when only 37 cases were reported, as of 13 December 2016.

Polio Vaccines Available

To date, two types of polio vaccines are available on the international market: oral polio vaccine (OPV) and inactivated polio vaccine (IPV). Both have been used extensively worldwide for decades.

IPV, first developed and licensed in 1955, is an inactivated vaccine given by injection and is available only in trivalent form. IPV stimulates a good humoral response. Polioviruses can be transmitted through oral secretions, and IPV is as effective as OPV in blocking this type of transmission. However, on its own it does not induce the same level of intestinal immunity as OPV, which means that it does comparably less well in preventing the wild virus from being excreted in feces and spreading in the environment.

OPV is a live attenuated vaccine licensed in 1961 as a monovalent (mOPV) vaccine and was followed by a trivalent version (tOPV) licensed for use in 1963. In 2009, a bivalent formulation (bOPV) was developed as part of the global polio eradication efforts. Thanks to its elevated intestinal immunogenic characteristic and its ease of administration, OPV use made it possible to eradicate polio in the Americas and other regions. Those vaccinated with OPV excrete the vaccine virus in feces, spreading it into the environment, which can then immunize others who have not been vaccinated. However, though very infrequently, OPV can cause some undesirable events such as vaccine-associated paralytic polio (VAPP) and polio vaccine-derived disease.

Polio Vaccine-Derived Disease

Vaccines containing live attenuated viruses (OPV) are very effective against the wild virus, but on very rare occasions they can cause Acute Flaccid Paralysis (AFP) by means of two mechanisms: re-acquiring neurovirulence and mutation toward neurovirulence.

In the **re-acquiring neurovirulence mechanism**, live attenuated viruses in OPV can, through prolonged replication in immuno-compromised persons or in a community with low vaccination coverage, reacquire the neurovirulence and transmissibility characteristic of the wild poliovirus. These vaccine-derived viruses can cause cases or outbreaks of paralytic poliomyelitis. Vaccine-derived polioviruses are subdivided into three categories:

1. **Circulating Vaccine-Derived Poliovirus (cVDPV):** A cVDPV is associated with sustained person-to-person transmission and is circulating in the environment. First recognized in 2000 during an outbreak on the island of Hispaniola (Haiti and the Dominican Republic), recent experience indicates that low vaccination coverage is a major risk factor for cVDPV outbreaks. cVDPV outbreaks can be stopped with 2 to 3 rounds of high-quality, large-scale supplementary immunization activities.
2. **Immunodeficiency-associated vaccine-derived viruses (iVDPV):** excretion of the virus is prolonged in people with immune system disorders; excretion has been reported to persist in some cases for 10 years or more.
3. **Ambiguous vaccine-derived viruses (aVDPV):** clinical isolates from people with no known immunodeficiency or sewage isolates of unknown source.

The **mutation toward neurovirulence mechanism** causes vaccine-associated paralytic poliomyelitis (VAPP). VAPP is a rare adverse event following OPV. IPV does not contain live virus, so it cannot cause VAPP. The mechanism of VAPP is likely to be a mutation, or reversion, of the vaccine virus to a more neurotropic form. Reversion is believed to occur in almost all vaccine recipients, but it only rarely results in paralytic disease. The paralysis that results is identical to that caused by wild virus, and it is permanent. VAPP does not spread to other people, so there are no outbreaks associated with VAPP. There are an estimated 250 to 500 cases of VAPP per year worldwide; of which, nearly 40% are due to the type 2 component of tOPV.[2] In Latin America and the Caribbean, one study evaluated the period between 1992 and 2011 and identified 191 cases of VAPP. The results showed an overall estimated risk of VAPP in LAC of 1 case per 1.19 million newborns or 1 case per 7.68 million doses administered.[3] An early study evaluating data from 1989 to 1991 estimated a higher risk of VAPP, showing 1 case per 1.5 to 2.2 million doses of OPV administered.[4]

History of Efforts Toward Polio Eradication

In light of the dramatic success of the Pan American Health Organization's (PAHO) mass polio campaigns in Brazil, Cuba, and Mexico in the early 80s, in September 1985, PAHO Member States unanimously adopted a resolution at the XXXI Meeting of the PAHO Directing Council, establishing the goal to eradicate the indigenous transmission of wild polio in the Americas by 1990. To that end, a Regional Polio Vaccination Strategy was adopted in the Americas.[5, 6] The strategy consisted of four components[7]:

1. Achievement and maintenance of high immunization levels with OPV, from the smallest geopolitical unit to the national level,
2. Effective surveillance and accurate diagnosis of all cases of AFP among persons under 15 years of age,
3. Area-wide vaccination around all new cases, and
4. Operation "Mop-up": special house-to-house campaigns to vaccinate all children under 5 in high-risk areas.

The high vaccination coverage reached with tOPV managed to interrupt transmission of the wild poliovirus in the Americas. The polio strategies helped countries continue to strengthen their routine immunization programs overall.

The last case of polio caused by wild poliovirus in the Region was detected in 1991 in Peru. In 1994, the International Commission for the Certification of the Eradication of Polio reviewed the data available in each country and territory and concluded that indigenous circulation of the wild virus had been interrupted in the continent, making the Americas the first region in the world to achieve this target.

Following polio control in the Region of the Americas, the 41st World Health Assembly (WHA) adopted in 1988 the resolution on global polio eradication that marked the commitment to eradicate polio from the world by the year 2000, and the creation of the Global Polio Eradication Initiative (GPEI) spearheaded by the World Health Organization (WHO), UNICEF, the Centers for Disease Control and Prevention (CDC), and Rotary International.

In the following years, three more regions received the certification of polio eradication: the Region of the Western Pacific in 2000; the Region of Europe in June 2002; and the Region of Southeastern Asia (including India) recently, in March 2014. Two Regions (Eastern Mediterranean and Africa) still have yet to be certified.

By 2011, all Regions of the world except for the Americas had suffered the reintroduction of poliovirus. The Independent Monitoring Board (IMB) of the GPEI stated in a report in October 2011 that the world was not on track to interrupt poliovirus transmission, and expressed concern about the real threat for failure of the GPEI, which would have had disastrous consequences, both in terms of lives lost and disabilities caused, and also as the most expensive public health failure in history.[8, 9, 10] For this reason, in May 2012, the 65th World Health Assembly adopted a landmark resolution declaring the completion of poliovirus eradication a "programmatic emergency for global public health" and requested that the WHO develop a comprehensive strategic plan for polio eradication. In response, the WHO Executive Committee approved the Polio Eradication and Endgame Strategic Plan 2013–2018 (the Endgame Plan), which provides a detailed approach and concrete timeline for complete polio eradication (see next section).

Also in 2012, WHO's Strategic Advisory Group of Experts on Immunization (SAGE) recommended suspending use of the type 2 component of tOPV in all national vaccination programs and switch to bivalent OPV (bOPV), which includes only type 1 and 3. SAGE recommended the switch because WPV type 2 had not been detected since 1999, and the continued use of tOPV in areas where coverage is inadequate was contributing to the emergence of cVDPV cases and undermining global polio eradication. Around 90% of polio cases due to cVDPV and a third of all vaccine-associated paralytic poliomyelitis (VAPP) cases were being caused by poliovirus type 2.[11]

SAGE also recommended that all countries introduce at least one dose of the inactivated polio vaccine (IPV) into their infant vaccination schedules before switching from tOPV to bOPV, as a risk mitigation measure to provide immunity in the event of a possible VDPV type 2 emergence or reintroduction of wild poliovirus due to failures in lab containment. This measure was later not implemented exactly as recommended due to supply constraints and other logistical issues. [11]

In January 2013, the WHO Executive Board approved the goals, targets, and timelines of the Endgame Plan 2013–2018.

The Endgame Plan

The Polio Eradication & Endgame Strategic Plan 2013–2018 was developed by the GPEI (Global Polio Eradication Initiative) in extensive consultation with national health authorities, global health initiatives, scientific experts, donors and other stakeholders. Its goal is the complete eradication of poliomyelitis and the elimination or containment of all wild and vaccine-derived polioviruses, while taking advantage of the backbone of the polio effort and plan to use it for delivering other health services to the world's most vulnerable children (Polio Legacy).[12]

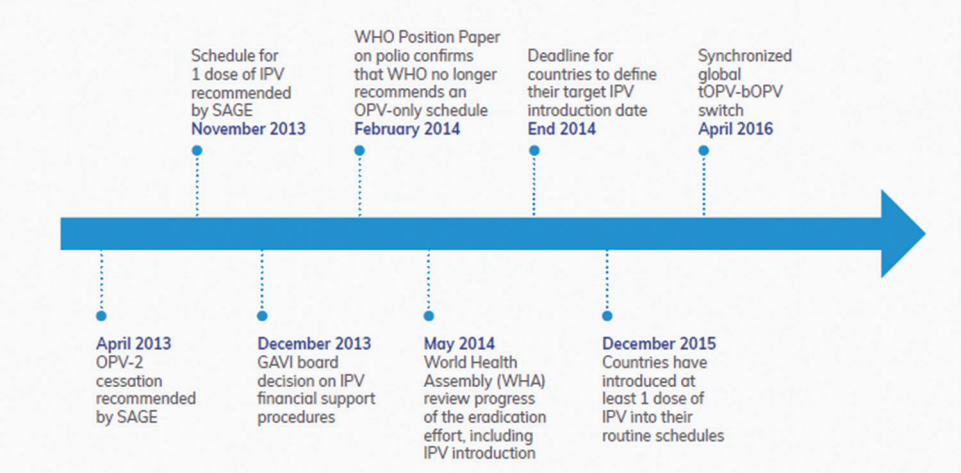
The Plan has four main objectives:

1. **Detect and interrupt all poliovirus transmission:** to stop all WPV transmission and any new outbreaks due to a cVDPV within 120 days of confirmation of the index case, through enhancing global poliovirus surveillance, improving OPV campaign quality to reach children in the remaining endemic and persistent cVDPV countries and ensuring rapid outbreak response.
2. **Strengthening of routine immunization systems, introduction of IPV and withdrawal of type 2 OPV:** to eventually withdraw all OPV, beginning with the withdrawal of the type 2 component of tOPV. The withdrawal of this type 2 component (OPV2) entails strengthening immunization systems, introducing at least one dose of affordable IPV into the routine immunization schedule globally.

3. **Certification of eradication and containment of residual live polioviruses:** to certify all regions of the world are polio-free and ensure that all poliovirus stocks are safely contained by 2018, including finalizing international consensus on long-term biocontainment requirements for polioviruses.
4. **Planning for post-polio eradication transition (originally termed 'legacy planning'):** to ensure that the world remains permanently polio-free and that the investment in polio eradication provides public health benefits in the future.

The introduction of IPV to reduce the risks associated with the withdrawal of OPV is a key element of this strategic plan. SAGE called for the withdrawal of tOPV from the world market in 2016, and once global eradication is achieved—envisioned for 2018—, bOPV use will also cease.[13] As a risk mitigation measure, prior to switching from tOPV to bOPV, SAGE recommended that all countries that were using only tOPV in their vaccination programs introduce at least one IPV dose into their routine vaccination schedules before the end of 2015. In October 2015, SAGE determined April 17 to May 1, 2016 as the two-week window for the global switch from tOPV to bOPV. [14] Figure 1 shows the projected timeline for IPV introduction, the switch, and OPV cessation.

Figure 1. Timeline for IPV Introduction and the Switch



Source: Lessons Learned on IPV Introduction and the Switch from tOPV to bOPV in the Americas. PAHO, Washington DC, 2017, page 13.

Regarding polio containment, in December 2014 the WHO developed the third edition of a global action plan to minimize poliovirus facility-associated risk after polio eradication that includes the containment of all polioviruses: wild, VDPV and Sabin. This containment plan is sequential and began with the containment of WPV-type 2 and VDPV2 in December 2015, followed by the containment of Sabin poliovirus type 2 by July 2016. The final containment of all wild poliovirus is planned for 2019 before bOPV cessation. All Sabin polioviruses type 1 and 3 will be contained after the interruption of bOPV. In the Americas, this first phase of containment has already included the containment of all WPV and VDPV types 1, 2, and 3.

The Endgame Plan in the Americas

In response to the creation of the Endgame Plan, in July 2013 the PAHO Technical Advisory Group of Immunization (TAG) recommend that PAHO convene a Polio Working Group (WG) to develop an adapted strategic plan for the Americas. The WG was tasked with analyzing the current polio epidemiology and immunization strategies in the Region as well as the different vaccination policy scenarios available in the context of the global push towards polio eradication. Based on this assessment, the WG made recommendations to the TAG on how to adapt the polio endgame to the Americas, particularly focusing on the introduction of IPV.[15]

The January 2014 WHO position paper had recommended a schedule consisting of a primary series of 3 OPV doses and at least 1 IPV dose, with an additional dose of OPV at birth for endemic countries or countries with high risk of importations. It also stated that, "if 1 dose of IPV is used, it should be given from 14 weeks of age (when maternal antibodies have diminished and immunogenicity is significantly higher) and can be co-administered with an OPV dose. Countries may consider alternative schedules based on local epidemiology, including the documented risk of VAPP prior to 4 months of age." It also stated the following: "In countries with high immunization coverage (e.g. 90%–95%) and low importation risk (neighboring countries and connections with similarly high immunization coverage) an IPV–OPV sequential schedule can be used when VAPP is a significant concern." [16]

Based on this and the regional epidemiology, the TAG Polio Working Group decided the evidence led to recommending IPV as first dose, which would be most beneficial particularly given the fact that around 50% of VAPP cases in the Region are due to the first OPV dose.[17, 3] As a consequence, the TAG recommended PAHO countries a sequential schedule as follows: "countries should consider two IPV doses followed by two OPV doses. However, if a country is considering only one IPV dose, this should be administered with the first DTP dose and followed by three OPV doses." [18]

In 2015, a non-inferiority study of an IPV-bOPV schedule compared to an all-IPV schedule was published. The study, which was conducted in Chile, assessed the immunogenicity of two different IPV-bOPV schedules compared with an all-IPV schedule in infants. The study concluded that seroconversion rates against polioviruses types 1 and 3 were non-inferior in the sequential IPV-bOPV schedules compared with an all-IPV schedule, and that the proportion of infants with protective antibodies was high after all three schedules. Furthermore, one or two doses of bOPV after IPV boosted intestinal immunity for poliovirus type 2, suggesting possible cross protection. Finally, the study showed evidence of humoral priming for type 2 from one dose of IPV.[19]

Another noteworthy difference in the implementation of the Endgame Plan of the Americas compared to the rest of the world is the fact that the Americas had from the onset utilized the polio elimination strategy to strengthen the national immunization programs by means of a complete integration with the Expanded Program on Immunization (EPI). In fact, the EPI program was given responsibility and ownership over the polio elimination plan. The Endgame Plan's objective related to ensuring that the investment in polio eradication provides public health benefits in the future ("legacy planning") had already been implemented in the PAHO Region thanks to the seamless integration of the polio elimination strategy and the EPI.

Finally, the PAHO Revolving Fund for Vaccine Procurement (RF) facilitated the purchase and licensing process of bOPV in most countries (98%), who readily accepted the vaccines without having to go through a special registration in the country.

Progress and Challenges

Strong progress towards global polio eradication has been made in the past few years, with more and more children in the remaining endemic countries now fully protected. The Endgame Plan was developed to capitalize on this progress to end all polio disease.

The Region of the Americas reported the last case of polio in 1991 and was certified as a polio-free Region in 1994. In the last 25 years since the certification of eradication, the Region has had only one outbreak of polio, which occurred in Haiti and the Dominican Republic between 2000 and 2001 caused by cVDPV.

The South-East Asia Region, which includes India, was certified a polio-free Region in March 2014. With this achievement, 80% of the world's population now lives in polio-free regions. The number of countries with endemic polio dropped from 125 in 1988 to just three (Afghanistan, Pakistan, and Nigeria), when only 37 cases were reported as of December of 2016.[20]

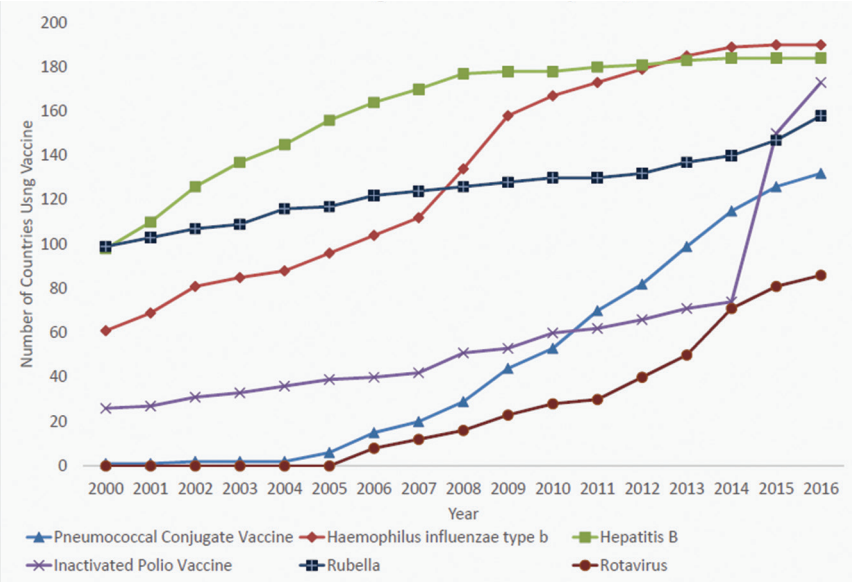
Nonetheless, coverage levels are still not optimal, especially in insecure and politically unstable areas. And since polio is an epidemic-prone disease, ongoing endemic transmission in a few countries will continue to threaten polio-free areas everywhere, unless it is eradicated completely.

For this reason, to meet the global polio eradication goal of eliminating all wild and vaccine related viruses, the use of OPV must eventually be stopped. However, until all wild polio viruses are eradicated, most countries will continue to use OPV because it is still considered the most effective vaccine at fighting wild poliovirus. The eventual withdrawal of OPV will be phased, and has already begun with the type 2 component of tOPV. Type 2 withdrawal from OPV is possible because no cases of WPV type 2 have been detected since 1999 and the continued use of the type 2 oral polio virus presents more risks than benefits, and actually undermines global eradication initiatives. Between 17 April and 1 May 2016, 155 countries around the world, 36 of which being from the Region of the Americas, simultaneously switched from the trivalent oral polio vaccine (tOPV), containing all 3 types of poliovirus, to the bivalent oral polio vaccine (bOPV), containing only types 1 and 3.

In order to ensure that populations have continued immunity against poliovirus type 2 after the switch to bOPV, all countries needed to introduce at least one dose of the inactivated poliovirus vaccine (IPV), which contains killed viruses from all 3 serotypes, and presents no risk of vaccine derived polio.

Prior to this recommendation in 2013, 126 countries globally including 32 countries in the Americas, did not use IPV.[21] This means that within a 2-year timeframe 126 countries needed to introduce a new vaccine into their routine immunization programs. Some new vaccines can take more than 10 years to be introduced on a global scale.[22] This was the fastest and largest global vaccine introduction in the history of vaccines, see Figure 1 on comparative time table for vaccine introductions.

Figure 2: Number of Countries Using Select Vaccines by Year, 2000–2016



Source: World Health Organization Immunization Repository and Year of Vaccine Introduction Database.

Unfortunately, due to unforeseen global shortages of IPV, 21 countries in other regions of the world (AFRO, EMRO, EURO and WPRO), did not meet the intended deadline of IPV introduction.[20] Additionally, at least 29 countries will face stock outs. All 50 of these countries are low risk countries for VDPV emergence; it is expected that these countries will not receive IPV until the end of 2017. However, 32 countries in the Americas that had previously not used IPV were able to introduce the vaccine in between early 2015 and early 2016.

Lessons Learned From the IPV Introduction and Switch in the Americas

Global Coordination Efforts

Many international and regional partners were of paramount importance for the success of the introduction of IPV and the switch in the Americas. The support received from partners such as WHO Headquarters, UNICEF, Centers for Disease Control and Prevention (CDC), the Task Force for Global Health, Rotary International and Gavi was critical throughout the entire process. The UNICEF Regional Office for Latin America and the Caribbean played a role in advocacy, social mobilization, and switch preparation and validation. Gavi and GPEI channeled financial support from multiple international donors to some countries to support gaps in the national budget for IPV introduction and the switch. Rotary played an important role advocating for IPV introduction and participating in the independent monitoring of the switch in some countries. Finally, the Bill and Melinda Gates Foundation (BMGF) conducted an immunological study of one dose of IPV in Chile, and studies of OPV-IPV in Cuba, which was a key piece of evidence to support the decision-making process in the Region.

PAHO's Regional Support to Countries

After the aforementioned Polio Working Group (WG) was convened in March and April 2014 to adapt the Endgame Plan to the regional situation in the Americas, the PAHO TAG held a special meeting and recommended supporting the renewed polio eradication efforts and the endgame eradication goals, including the permanent withdrawal of OPV from routine vaccination programs, and the use of sequential schedules.

Based on TAG's recommendation and the urgency of the IPV introduction and the switch, PAHO developed a comprehensive technical cooperation strategy that included several virtual and face-to-face meetings and the development and adaptation of support documents to maximize chances of a successful regional IPV introduction.

By the first quarter of 2015, PAHO had received the formal commitment from all LAC countries for the introduction of IPV. PAHO formed a new Regional Certification Committee (RCC), which met for the first time in June of 2015.

Part of the countries' success depended on the availability of technical and communication materials to support any vaccine introduction process. Countries frequently find it a challenge to develop their own materials due to time and financial constraints, and sometimes also a lack of technical capacity on specific technical issues. To help countries overcome this challenge, and also to promote the use of uniform materials and communication messages across the Region, PAHO developed the PAHO IPV Introduction Practical Guide and adapted and expanded on several materials developed by the Immunization Management Group (IMG) of the GPEI, to support countries in the introduction of the IPV vaccine. The IMG is made up of partners from WHO, UNICEF, GAVI, CDC, Rotary, and BMGF. The adaptation of materials was necessary largely due to the fact that the Region had opted for a different vaccination schedule with IPV as the first dose. The materials included technical documents, training and communication information and tools. These materials were shared with countries in editable formats (Word documents or Power Point slides) so that countries could adapt them as needed. The PAHO communication focal points were also involved together with their PAHO immunization counterparts in country, to allow for an integrated approach for the use of these materials in country.

WHO sent guidelines for the switch, which PAHO translated and shared with countries. PAHO requested countries to share their switch plans by mid-2015. By September 2015, PAHO had received the switch plans from all countries, and reviewed the plans against an adaptation of a checklist that had been provided by GPEI. PAHO provided significant direct technical cooperation, including some regional visits to selected countries prior to the switch, to ensure preparedness and avoid any delays in the Region. Additionally, to have an overall picture of the situation across the Region, PAHO developed a dashboard to monitor the implementation of key activities. The switch dashboard contained 41 activities selected according to the optimal period for their implementation to guarantee a safe switch. The dashboard allowed for a quick identification of activities that were falling behind schedule or required greater attention. Of the 41 activities, 18 were marked as "milestones". Carrying out the activities helped ensure a successful switch, while failure to meet the milestones compromised the safety of the switch in the country and, consequently, in the Region. This tool was useful for Regional Certification Commission (RCC) for the Polio Endgame in the Region of the Americas and National Certification Committees (NCC) members, immunization program managers and personnel, and PAHO to follow up with the progress and detect difficulties or delays.

Countries' Perspectives on IPV Introduction

In the PAHO Region, 19 countries, representing 70% of the birth cohort in the Americas, were already using the IPV vaccine in their national schedule prior to 2015. The remaining 32 countries, representing 30% of the birth cohort in the Americas (4,606,700) introduced IPV as part of the Endgame Plan, between 2015 (22 countries) and the first half of 2016 (10 countries).

In March 2016, PAHO sent out a survey to the 32 countries from Latin America and the Caribbean that had introduced IPV in 2015 or 2016 as part of the Endgame Plan. Overall, 31 out of the 32 countries replied to the survey. It is noteworthy that over half the countries took less than 3 months to make the decision to introduce IPV, and the main facilitators were the global and national commitment to polio elimination. Regarding the IPV introduction process itself, PAHO's technical support and staff training were the predominant facilitators, and the negative perception of change from "drop to shot" was perceived as the main challenge. A summary of the survey results is presented in Table 1.

Table 1. Main Findings from the IPV Introduction Survey to Countries

Key Findings IPV Introduction Survey (N=31)				
			Number	**Percent %**
Decision to Introduce IPV	**Time to Decide**	Countries that took 6 months or less to make the decision	26	86%
		Countries that took 1 to 3 months to make the decision	17	56%
	Main Facilitators	Global commitment	9	29%
		National political support and commitment	6	19%
		Presence of a regional TAG recommendation	5	16%
		Availability of supporting evidence around the rationale for the introduction	4	13%
	Main Barriers	No difficulties in the decision-making process	21	68%
		Financial issues	4	13%
IPV Introduction Process Itself	**Nationwide or Phased Introduction**	Countries that introduced IPV simultaneously nationwide.	25	81%
		Countries with phased introduction	6	19%
	Main Facilitators	PAHO support (technical cooperation and guidelines)	23	74%
		Staff training	19	61%
		Political will and support	17	55%
		Commitment of staff	17	55%
		International commitment to the need for global IPV introduction to achieve polio eradication	14	45%
		Experience, preparedness and planning of the EPI	13	42%
	Main Barriers	Negative perception of change from drop to shot	19	61%
		Insufficient or delayed training	12	39%
		Financial constraints	8	26%
		Insufficient monitoring or supervision in the field	8	26%

Source: PAHO IPV Introduction Survey, 2016.

Countries' Perspectives on the Switch From tOPV to bOPV

Thirty-six countries of the Americas switched from tOPV to bOPV in the Americas in April 2016. In July 2016, PAHO administered a survey to these 36 countries and all countries replied. Again, PAHO's support and staff training were the main facilitators to plan the switch. Commitment of healthcare workers was the main facilitator for successfully implementing the switch, and support of stakeholders involved in the validation process was the main positive factor in the validation of the switch. Table 2 provides a summary of main findings from the survey.

Table 2. Main Findings From the Survey to Countries on the Switch

Key Findings Switch Survey (N=36)				
			Number	**Percent %**
Planning the Switch	**Main Facilitators**	Staff training	11	31%
		Counting on PAHO technical support and documents	11	31%
		Commitment of healthcare workers	9	25%
		Involvement of healthcare workers and key national players	9	25%
		Political will	7	19%
	Main Barriers	Countries that did not encounter any obstacles in the planning process	15	42%
		Concomitant events as a factor that made the planning more difficult	11	31%
Implementing the Switch	**Main Facilitators**	Commitment of healthcare workers	10	28%
		Monitoring and supervision activities	5	14%
		Staff training	4	11%
	Main Barriers	Countries with no implementation obstacles for the switch	14	39%
		Vaccine transportation-related issues	7	19%
Validating the Switch	**Main Facilitators**	Commitment/support of stakeholders involved in the validation process	12	33%
		External support (technical or financial)	10	28%
	Main Barriers	Countries with no obstacles in the validation process	11	31%
		Insufficient financial resources for the switch	5	14%
		Delays in receiving the validation forms from the lower level	5	14%

Source: PAHO tOPV to bOPV Switch Survey, 2016.

Conclusions

One of the most critical points for success of IPV introduction and the switch to bOPV was the global structure to support the regions. There were many international organizations working together to support the 126 countries across the globe that needed to introduce IPV and make a synchronized switch. The WHO, UNICEF, CDC, Task Force for Global Health, Rotary International, and Bill and Melinda Gates Foundation, all worked together in the Immunization Systems Management Group (IMG), with permanent and substantial exchange with the regions. The issues with global vaccine supply and vaccine delays were major obstacles that had to be dealt with at international, regional and national levels. Pan Americanism played an important role when the global vaccine shortage did not allow for countries to introduce more than one dose of IPV so PAHO had to recommend all countries who were not already using IPV, to introduce a single dose. This experience, the largest scale up of a vaccine ever undertaken worldwide, and its lessons learned conform an important documentation of the Polio Legacy in the Americas and worldwide.

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