WEEKLY EPIDEMIOLOGICAL REPORT
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Is there a place of IPV in the routine immunization programme in the near future?

An increase in the number of children vaccinated with the inactivated polio vaccine (IPV) in the private sector instead of the nationally recommended oral polio vaccine (OPV) has been noted by the health authorities in Sri Lanka in recent times. In spite of some advantages of IPV from purely an individual perspective, the national campaign to eradicate poliomyelitis is driven by the successes of OPV, with no known cases of poliomyelitis reported since 1993. In this article, we discuss the rationale for the continued use of OPV in the national immunization programme in Sri Lanka.

Since 1988, when the Global Polio Eradication Initiative was launched, the number of polio cases reported each year has reduced by more than 99%, globally. This has been achieved with the use of polio vaccines. There are two types of polio vaccines in use today: the live-attenuated oral polio vaccine (OPV) and the inactivated polio vaccine (IPV).

OPV is the only recommended polio vaccine to achieve the eradication of wild poliovirus. However, the nature of the vaccine is such that Vaccine Associated Paralytic Polio (VAPP) can occur, at a rate of 2-4 cases per one million birth cohort. Furthermore, outbreaks may occur due to circulating vaccine-derived poliovirus (cVDPVs). Thus, once poliovirus transmission is interrupted globally, the benefits gained from OPV no longer outweigh the burden of disease caused by VAPP and cVDPVs. Also, rarely, VDPV may be excreted for a prolonged time from a person with a severe primary immunodeficiency syndrome (iVDPVs).

If OPV was used after the eradication of polio, it is expected that each year there will be 250-500 cases of and up to one outbreak of cVDPV.

Why continue with the use of OPV?

However, there are still many benefits of the OPV vaccine.

OPV induces much greater intestinal mucosal immunity than IPV. This not only protects children from polio infection, but should a child be infected with polio, multiplication of polio virus inside the gut is reduced, reducing secretion of virus and thereby its transmission. This has positive implications on reducing disease transmission in a population.

Furthermore, the use of OPV can cause immunization of non-immunized contacts due to faecal-oral spread of the oral polio strains. This is important in areas where sanitation is poor.

The administration of OPV is easier and five times cheaper than IPV. This is because the cost of the vaccine is far less than that of IPV and because it is administered orally, injection supplies and professionally trained health workers are not required. As it is simple to administer, it is better for mass campaigns and programs for difficult-to-reach populations. Also, unsafe injection is not a problem as OPV is administered orally.

From the list of advantages and disadvantages of OPV and IPV (box in page 2), it can be seen that

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OPV vs. IPV: Their Advantages and Disadvantages

OPV *was developed in 1960 by Dr. Albert Sabin. It consists of live polioviruses attenuated by extensive passage of the original wild-type stains of poliovirus in cell cultures or in monkeys in vivo. This results in mutation of the virus, which weakens its potential to cause paralysis, while maintaining the antigenity by inducing the production of antibodies by the immune systems of the human body.*

The advantages of OPV are as follows:

1. OPV can protect children against paralysis once infected as well as limit the spread of wild virus among their contacts because OPV induces both serum immunity and intestinal immunity. Intestinal immunity limits the multiplication of wild virus inside the gut and thus reduces fecal excretion (hence possible transmission) of the wild virus.

2. The use OPV can produce secondary immunization through the spread of a vaccine virus in stools, which indirectly immunizes those with secondary contacts. This is particularly important in developing countries where the sanitation status permits this spread and the immunization coverage is low.

3. OPV can be delivered with low cost, firstly because the price is lower than that of IPV, secondly because OPV is administered orally, and thus the vaccination does not need professionally trained health workers and injection-related supplies (e.g., syringes).

4. OPV is delivered orally, so unsafe injection is not an issue.

The disadvantages of OPV are as follows:

1. It can cause vaccine-associated paralytic poliomyelitis (VAPP), although the probability is very low (1 case per 2.5 million doses), because some people are sensitive to vaccine virus, especially those who are immunodeficient.

2. OPV may be less potent than IPV in inducing serum immunity in developing countries, where the infection of the intestines by other viruses may prohibit the intake of OPV. Thus it often needs repeated vaccination of up to five to 10 doses to protect all children.

IPV *was developed in 1955 by Dr. Jonas Salk. It consists of killed viruses, which are cultivated in monkey kidney cells and activated by incubation of the viruses in 1:1000 formalin for 12-14 days at 37 C. IPV is delivered via injection.*

The advantages of IPV are as follows:

1. It can effectively protect individual children against paralysis after three doses with a protection rate of nearly 100 percent.

2. It does not cause VAPP because the vaccine consists of killed poliovirus.

3. IPV can be combined with other injectable vaccines (such as DTP and Hib) to reduce the cost of administration and increase immunization coverage.

The disadvantages of IPV are as follows:

1. IPV only induces serum immunity, not intestinal immunity. Thus, IPV can effectively protect the vaccinated individuals against paralysis if infected, but infected children can become a source of infection by wild virus if their antibody levels are not high enough to stop virus excretion.

2. The secondary immunization effect of OPV by the spread of vaccine virus in stools is not seen with IPV.

3. The cost of IPV vaccination is higher than OPV because its vaccine price is higher and requires injections by trained health workers.

4. There is a risk of unsafe injections, which can lead to transmission of blood-borne diseases.

both vaccines are effective, but not perfect. These characteristics of the two vaccines have made the choice between them extremely hard, and have led to variation in choice among countries and across different stages of a polio control program.

It is also pertinent to consider the implications of the cessation of immunization with OPV in this background.

Risks associated with OPV cessation

Following cessation of OPV, there is an immediate risk of cVDPV emergence, but this is remote and diminishes over 12-24 months. In any case, the risk is low in countries with high routine immunization coverage like ours.

There is also the risk of poliovirus re-introduction from a vaccine manufacturing site or research facility. This risk will reduce if countries fully implement the containment of poliovirus.

Prerequisites for OPV cessation

In a global view, there are 6 prerequisites that should be met before the cessation of OPV and the possible introduction of IPV in the polio end-game.

1. Confirmation of interruption of wild poliovirus transmission globally
2. Appropriate biocontainment of all polioviruses
3. International stockpile of monovalent OPV (mOPV)
4. Highly-sensitive surveillance for circulating polioviruses
5. Procedure for internationally-simultaneous OPV cessation
6. Long-term routine polio immunization policy (i.e. national IPV decisions)

In this backdrop, all responsible health professionals should strive to adhere to the national guidelines, and advocate the use of OPV with the eradication of poliomyelitis from the entire country taking precedence over individual considerations.

The editor wishes to acknowledge Dr. Paba Palihawadana (Deputy Epidemiologist, Epidemiology Unit) for the assistance in the preparation of this article.

Table 1: Vaccine-preventable diseases & AFP

10th - 16th March 2007 (11th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Number of cases during same week in 2006	Total number of cases to date in 2007	Total number of cases to date in 2006	Difference between the number of cases to date between 2007 & 2006
	W	C	S	NE	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	02 KD=1 NE=1	01 GL=1	00	00	00	00	00	03	02	18	38	-52.6%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00.0%
Measles	01 KL=1	00	00	00	00	00	00	00	01	00	12	04	200.0%
Tetanus	00	00	00	00	00	00	00	00	00	00	09	11	-18.2%
Whooping Cough	01 KL=1	00	01 MT=1	00	00	00	00	00	02	00	12	16	-25.0%
Tuberculosis	60	35	16	10	00	00	17	07	145	195	2044	2193	-6.8%

Table 2: Diseases under Special Surveillance

10th - 16th March 2007 (11th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Number of cases during same week in 2006	Total number of cases to date in 2007	Total number of cases to date in 2006	Difference between the number of cases to date between 2007 & 2006
	W	C	S	NE	NW	NC	U	Sab					
DF/DHF*	24	05	06	01	13	02	01	09	61	157	1402	2454	-42.9%
Encephalitis	00	00	00	00	00	00	00	01 KG=1	01	03	56	26	+115.4%
Human Rabies	00	00	00	01 BT=1	01 KR=1	00	00	00	02	00	20	16	+25.0%

Table 3: Newly introduced Notifiable Diseases

10th - 16th March 2007 (11th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Total number of cases to date in 2007
	W	C	S	NE	NW	NC	U	Sab		
Chickenpox	26	03	10	04	08	01	02	10	64	659
Meningitis	00	00	00	00	00	00	00	00	00	46
Mumps	12 CB=4 GM=5 KL=3	00	01 GL=1	01 TR=1	01 KR=1	00	04 BD=2 MO=2	05 KG=2 RP=3	24	160

*DF / DHF refers to Dengue Fever / Dengue Haemorrhagic Fever.
NA= Not Available.

Sources:

Weekly Return of Communicable Diseases:
Diphtheria, Measles, Tetanus, Whooping Cough, Human Rabies, Dengue Haemorrhagic Fever, Japanese Encephalitis, Chickenpox, Meningitis, Mumps.

Special Surveillance:
Acute Flaccid Paralysis.

National Control Program for Tuberculosis and Chest Diseases:
Tuberculosis.

Details by districts are given in Table 5.

Provinces: W=Western, C=Central, S=Southern, NE=North & East, NC=North Central, NW=North Western, U=Uva, Sab=Sabaragamuwa.
DPDHS Divisions: CB=Colombo, GM=Gampaha, KL=Kalutara, KD=Kandy, ML=Matale, NE=Nuwara Eliya, GL=Galle, HB=Hambantota, MT=Matara, JF=Jaffna, KN=Killinochchi, MN=Mannar, VA=Vavuniya, MU=Mullaitivu, BT=Batticaloa, AM=Ampara, TR=Trincomalee, KM=Kalmunai, KR=Kurunegala, PU=Puttalam, AP=Anuradhapura, PO=Polonnaruwa, BD=Badulla, MO=Moneragala, RP=Ratnapura, KG=Kegalle.

Table 4: Laboratory Surveillance of Dengue Fever

10th - 16th March 2007 (11th Week)

Samples	Number tested	Number positive *	Serotypes				
			D_1	D_2	D_3	D_4	Negative
Number for current week	09	01	00	00	00	00	01
Total number to date in 2007	210	10	00	02	02	00	05

Source: Genetech Molecular Diagnostics & School of Gene Technology, Colombo. * Not all positives are subjected to serotyping.

Table 5: Selected notifiable diseases reported by Medical Officers of Health
10th - 16th March 2007 (11th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Returns Re-ceived Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	11	414	08	46	00	03	01	21	00	20	03	28	00	01	00	10	**100**
Gampaha	09	156	05	51	00	07	01	43	00	02	16	49	00	06	01	30	**79**
Kalutara	04	103	05	66	00	01	00	14	01	11	07	30	00	01	01	23	**82**
Kandy	03	174	01	42	00	02	00	17	00	04	02	28	01	20	06	79	**77**
Matale	01	49	05	52	00	03	01	05	00	03	00	13	01	03	05	46	**83**
Nuwara Eliya	01	18	02	39	00	00	00	24	00	366	00	05	01	16	06	70	**86**
Galle	01	42	06	31	00	04	00	04	00	03	04	19	03	15	00	06	**88**
Hambantota	03	18	00	12	00	00	01	07	00	01	02	15	01	15	02	07	**91**
Matara	02	43	04	57	00	02	02	14	03	04	05	41	05	81	01	07	**94**
Jaffna	00	05	00	28	00	02	00	193	00	00	00	00	00	72	00	06	**00**
Kilinochchi	00	00	00	00	00	00	00	02	00	00	00	00	00	02	00	02	**00**
Mannar	00	07	00	11	00	00	01	30	00	00	00	00	00	00	00	04	**50**
Vavuniya	00	10	00	11	00	00	00	08	00	06	00	02	00	00	00	03	**100**
Mullaitivu	00	00	00	04	00	02	00	09	00	00	00	00	00	00	00	00	**20**
Batticaloa	01	06	01	43	00	03	03	12	00	02	00	00	00	00	04	98	**55**
Ampara	00	01	00	23	00	00	00	03	00	00	00	00	00	00	00	07	**14**
Trincomalee	00	23	02	21	00	01	00	09	00	17	00	01	00	00	01	09	**89**
Kurunegala	11	112	01	58	00	00	02	12	00	04	00	09	01	23	01	09	**67**
Puttalam	02	60	03	23	00	09	03	20	00	00	00	04	00	00	08	35	**100**
Anuradhapura	01	15	00	23	00	05	00	12	01	02	00	09	00	11	01	18	**74**
Polonnaruwa	01	20	00	40	00	02	00	03	00	00	00	11	00	00	00	03	**86**
Badulla	01	12	08	97	00	00	01	21	00	08	00	15	04	27	09	62	**100**
Monaragala	00	05	03	51	00	00	02	12	00	00	01	15	04	18	00	05	**100**
Ratnapura	06	50	12	136	00	07	01	22	01	06	01	18	00	05	01	22	**81**
Kegalle	03	58	07	41	01	03	03	12	00	00	01	25	01	09	03	17	**73**
Kalmunai	00	01	00	26	00	00	00	05	00	00	00	00	00	00	01	58	**33**
SRI LANKA	**61**	**1402**	**73**	**1032**	**01**	**56**	**22**	**539**	**06**	**459**	**42**	**337**	**22**	**325**	**51**	**636**	**76**

Source: Weekly Returns of Communicable Diseases (WRCD).
***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.
****Timely** refers to returns received on or before 24 Mar. 2007. Total number of reporting units = 290. Number of reporting units data provided for the current week: 220.
A = Cases reported during the current week. **B** = Cumulative cases for the year.

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