WEEKLY EPIDEMIOLOGICAL REPORT

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Polio Eradication Endgame (Part I)

This is the first in a series of two articles on Polio Eradication

Background

Poliomyelitis is a highly infectious disease caused by a virus which is transmitted via faeco-oral route. Children under five years of age are mainly at risk. When a child is infected with wild poliovirus, it enters the body through the mouth and multiplies in the intestine and then sheds into the environment through the faeces where it can spread rapidly through a community, especially in situations of poor hygiene and sanitation.

Agent

Poliovirus (genus Enterovirus) has three strains known as Wild Polio Virus (WPV) type 1, 2 and 3. They are small (27–30 nm), non-enveloped viruses with capsids enclosing a single-stranded, positive-sense RNA genome about 7,500 nucleotides long. The virus enters the blood stream and invades the central nervous system resulting inflammation, mainly involving grey matter of the spinal cord but can also affect brain, resulting polio encephalitis.

Pathophysiology

The incubation period for poliovirus is 5-35 days. The viral particles initially replicate in the nasopharynx and Gastro-Intestinal tract and then invade lymphoid tissues, with subsequent hematologic spread. After a period of viremia, the virus becomes neurotrophic and causes destruction of the motor neurons in the anterior horn and brainstem.

Symptoms

Initial symptoms are fever, fatigue, headache, vomiting, neck stiffness and pain in the limbs. It can manifest in different forms, mainly as inapparent infection, abortive disease, non paralytic poliomyelitis and paralytic disease.

As the virus multiplies in the central nervous system it destroys the nerve cells that innervate muscles. The affected muscles are no longer functional and the limb becomes floppy and lifeless, which is known as acute flaccid paralysis (AFP) and occurs in one in 200 infections. Another manifestation is bulbar polio which is more extensive paralysis, involving the trunk and muscles of the thorax and abdomen resulting quadriplegia. Among those affected, 5% to 10% die when their respiratory muscles become paralyzed.

Treatment and Prevention

There is no cure for polio, so that it can only be prevented by vaccination, which needs to be given multiple times.

Epidemiology

Epidemics of poliomyelitis were observed during the 19th and 20th centuries, reaching its peak in the mid 1950s. After the introduction of Global Polio Eradication Initiative (GPEI) in 1988, the global incidence of polio has reduced from an estimated 350,000 cases in 1988 to just 223 cases in 2012 and the number of countries with endemic polio decreased from 125 to 3 (Afghanistan, Nigeria and Pakistan being the last three endemic countries) due to aggressive immunization programmes. In Sri Lanka, Poliomyelitis was made notifiable in 1944, Acute Flaccid Paralysis (AFP) was made notifiable as suspected poliomyelitis in 1990 and Acute Flaccid Paralysis (AFP) gazetted as a notifiable disease in 2005. The last case of confirmed poliomyelitis from the country was reported in 1993 and Sri Lanka has been polio free since then.

History of vaccination against Polio in Sri Lanka

A pilot project to immunize children against poliomyelitis using trivalent Oral Polio Vaccine (tOPV) was carried out in a health unit area in Kalutara District in September 1961 and it was introduced

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island wide, when the worst outbreak of poliomyelitis occurred in 1962. All children in the age group of 3 months to 15 years were immunized. The first mass immunization programme for children under 8 years of age covering the entire country was conducted in 1963.

Thereafter routine immunization was carried out in all child welfare clinics in the country, but the coverage achieved was low. Mass campaigns were conducted annually from 1968 to 1973, but these were restricted to the health divisions where increased incidence of poliomyelitis was reported during the year. Since the initiation of the Expanded Programme on Immunization (EPI) in 1978, case incidence of poliomyelitis dropped drastically as the immunization coverage soared and all aspects of the programme improved, specially the "cold chain" which is of vital importance in retaining the potency of Polio vaccine.

Case based surveillance of individual acute flaccid paralysis (AFP) cases was initiated in 1991 in order to detect a possible poliomyelitis case wherever it may occur.

Earlier, Polio vaccine was donated to Sri Lanka by UNICEF and Rotary International–Sri Lanka. Since 1995, all requirements of polio vaccine are provided by the Government of Sri Lanka. The financial sustainability for successful implementation will be ensured by the Sri Lankan Government. In order to reduce the financial burden on governments throughout the world, WHO has endorsed a policy for the use of opened multi dose vials of liquid vaccines in subsequent immunization sessions without compromising the quality and safety of the vaccine. This has been practised in many other countries for the last few years. After considering all relevant factors, the National Advisory Committee on Communicable Diseases decided to introduce the open vial policy for OPV in Sri Lanka from February, 2005.

Vaccines

Interruption of person to person transmission of the virus by vaccination was the critical step in global polio eradication and two polio vaccines are used for this purpose. The first one is an injectable inactivated poliovirus (IPV) and the other is an oral vaccine which contain live attenuated poliovirus (OPV).

OPV - The oral polio vaccine (OPV) was developed in 1961 by Albert Sabin, which is also called "trivalent oral polio vaccine" or "Sabin vaccine". It consists of a mixture of live, attenuated (weakened) polio virus strains of all three polio virus types known as Wild Polio Virus (WPV) type 1, 2 and 3 thus it produces antibodies in the blood to all three types of poliovirus. OPV also produces a local, mucosal immune response in the mucous membrane of the intestines. In the event of infection, these mucosal antibodies limit the replication of the wild poliovirus inside the intestine. This intestinal immune response to OPV is thought to be the main reason for the prevention of person-to-person transmission of wild poliovirus. In the current EPI schedule, five doses of OPV are given at 2, 4, 6, 18 months and at the age of 5 years.

Advantages of OPV

Advantages of OPV including easy administration, low cost, producing intestinal immunity to all three strains of poliovirus, its' ability to interrupt the wild virus transmission and the potential to infect household and community contacts secondarily with attenuated virus, makes it the vaccine of choice for the eradication programme. OPV is thermo-labile and therefore strict maintenance of cold chain is mandatory to receive these advantages.

Disadvantages of OPV

Although OPV is safe and effective against the wild virus, it has some disadvantages as well. Although this is extremely rare, it can cause paralysis (vaccine-associated paralytic poliomyelitis - VAPP). For every birth cohort of 1 million children in OPV-only using countries, there are 2-4 cases of VAPP. Of these, about 40% are caused by OPV's type 2 component.

The second disadvantage is that when a vaccine-related virus is passed from person to person, very rarely it can get changed genetically and acquire wild virus transmissibility and neurovirulence characteristics (Vaccine Derived Polio Virus-VDPVs). Studies are way under to more clearly define the risks of VDPVs, including circulating VDPVs (cVDPVs), immunodeficiency-associated VDPVs (iVDPVs) and ambiguous VDPVs (aVDPVs). VDPVs can result from the continued reintroduction into the human population of the attenuated polioviruses contained in the oral polio vaccine. cVDPV are responsible for causing outbreaks of the paralytic disease and almost all cVDPV outbreaks in recent years have been caused by a type 2 vaccine derived virus.

IPV - IPV is produced from wild-type poliovirus strains of each serotype that have been inactivated (killed) with formalin. As an injectable vaccine, it can be administered alone or in combination with other vaccines. Generally, three spaced doses are administered to generate adequate levels of antibodies and a booster dose is added during late childhood in most countries.

Advantages of IPV

The major advantage of IPV is that there is no risk of Vaccine Associated Paralytic Poliomyelitis (VAPP). IPV prevents paralytic poliomyelitis by producing sufficient serum antibody levels to prevent the poliovirus from entering the nervous system via the blood stream and the adverse events following administration of IPV are very mild and transient.

Disadvantages of IPV

The degree of mucosal immunity produced by the IPV in the intestinal mucosa is significantly less than that provided by OPV, although this difference may be less pronounced in the pharyngeal mucosal lining. As a result, a child immunized with IPV may not develop the disease if infected; but is likely to spread the wild poliovirus to other children as the vaccine has only limited effects on intestinal excretion of poliovirus. Moreover, IPV vaccine must be given by injection, requiring trained personnel and additional equipment as well as causing pain. In addition, IPV is more expensive than OPV. Although IPV has been used successfully in the polio eradication programs in few countries, its ability to eradicate poliovirus in developing countries where faeco-oral transmission predominates is doubtful.

Compiled by Dr. H. A. Shanika Rasanjalee of the Epidemiology Unit

Table 4: Selected notifiable diseases reported by Medical Officers of Health 04th – 10th Janu 2014 (02nd Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishman-iasis		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	193	501	1	3	0	1	0	0	0	0	1	6	0	0	0	1	0	0	2	7	0	1	0	0	**46**	**54**
Gampaha	68	172	1	5	0	0	0	2	0	0	2	2	1	1	0	2	0	0	2	4	1	6	0	1	**47**	**53**
Kalutara	55	106	2	4	0	0	2	3	2	3	8	12	0	0	1	1	0	0	1	2	1	2	0	0	**62**	**38**
Kandy	19	36	2	4	0	0	0	0	0	0	0	1	1	3	1	2	0	0	4	4	2	2	0	0	**70**	**30**
Matale	3	13	0	3	0	0	0	0	0	0	1	4	0	0	3	4	0	0	1	1	0	0	0	0	**46**	**54**
NuwaraEliya	9	18	2	5	0	0	1	2	0	0	0	0	1	2	2	3	0	0	1	3	0	1	0	0	**62**	**38**
Galle	25	50	1	3	1	2	0	0	0	0	3	15	1	5	0	0	0	0	6	11	4	4	0	0	**80**	**20**
Hambantota	10	23	4	9	1	1	1	2	0	0	3	7	2	4	3	3	0	0	5	6	1	7	3	13	**83**	**17**
0Matara	12	22	0	4	0	0	3	9	0	0	1	2	4	5	1	3	0	0	4	7	4	7	1	4	**100**	**0**
Jaffna	23	66	10	21	0	0	6	15	0	5	1	2	26	53	0	1	0	0	0	2	1	2	0	0	**67**	**33**
Kilinochchi	2	3	0	0	0	0	2	2	0	0	0	0	1	4	0	0	0	0	0	0	0	0	1	1	**50**	**50**
Mannar	1	2	0	2	2	2	2	5	0	0	2	2	1	1	0	0	0	0	0	0	0	0	1	1	**80**	**20**
Vavuniya	1	2	2	5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**50**	**50**
Mullaitivu	3	6	3	4	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	**60**	**40**
Batticaloa	6	11	4	9	0	0	0	2	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	**57**	**43**
Ampara	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**29**	**71**
Trincomalee	11	19	0	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	**33**	**67**
Kurunegala	27	52	1	3	0	1	0	1	0	0	1	2	3	4	1	2	0	0	3	8	1	1	3	4	**56**	**44**
Puttalam	9	31	2	5	0	0	0	0	3	4	1	3	0	0	0	0	0	0	2	4	0	0	0	1	**46**	**54**
Anuradhapura	7	10	3	9	0	0	0	0	0	1	3	6	2	3	0	0	0	0	3	6	0	1	7	9	**53**	**47**
Polonnaruwa	5	19	2	7	0	0	0	0	0	0	3	5	0	0	0	0	0	0	4	7	0	1	0	1	**57**	**43**
Badulla	9	24	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	2	3	0	1	0	0	**59**	**41**
Monaragala	3	8	0	3	0	0	0	0	0	0	0	2	0	2	0	4	0	0	1	2	0	0	0	1	**45**	**55**
Ratnapura	8	26	0	7	0	0	1	3	2	2	4	19	0	0	11	19	0	0	7	8	0	1	0	0	**61**	**39**
Kegalle	21	39	1	2	2	2	2	3	0	0	6	9	2	2	3	5	0	0	8	12	1	2	0	1	**73**	**27**
Kalmune	0	5	6	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	**31**	**69**
SRILANKA	**530**	**1264**	**48**	**132**	**8**	**11**	**22**	**51**	**7**	**16**	**40**	**100**	**45**	**90**	**26**	**50**	**0**	**0**	**60**	**103**	**17**	**42**	**17**	**38**	**59**	**41**

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 10th January , 2014 Total number of reporting units 337 Number of reporting units data provided for the current week: 200 C**-Completeness

Table 1: Vaccine-Preventable Diseases & AFP

04th – 10th Jan 2014 (02nd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2014	Number of cases during same week in 2013	Total number of cases to date in 2014	Total number of cases to date in 2013	Difference between the number of cases to date in 2014 & 2013
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	00	00	00	00	00	00	00	00	02	00	02	-100%
Diphtheria	00	00	00	00	00	00	00	00	00	00	-	00	-	%
Mumps	01	01	03	01	01	02	01	00	01	11	25	27	52	-48.1%
Measles	16	03	27	00	00	03	08	02	17	76	06	148	09	+1544.4%
Rubella	00	00	00	00	00	00	00	00	00	00	-	00	-	%
CRS**	00	00	00	00	00	00	00	00	00	00	-	00	-	%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	%
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	-	00	-	%
Japanese Encephalitis	00	00	02	00	00	00	00	01	00	03	-	03	-	%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	01	04	-75%
Tuberculosis	41	33	37	10	12	07	05	08	39	192	270	519	396	+31.1%

Key to Table 1 & 2

Provinces: W: Western, C: Central, S: Southern, N: North, E: East, NC: North Central, NW: North Western, U: Uva, Sab: Sabaragamuwa.

RDHS 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.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,

Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis

CRS** =Congenital Rubella Syndrome

AFP and all clinically confirmed Vaccine Preventable Diseases except Tuberculosis and Mumps should be investigated by the MOH

Dengue Prevention and Control Health Messages

Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them

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Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to chepid@sltnet.lk. **Prior approval should be obtained from the Epidemiology Unit before publishing data in this publication**

ON STATE SERVICE

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