WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit
Ministry of Health

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Vaccine Components

Vaccine are composed of several components. They are:

1. Active components

2. Adjuvants

3. Diluents

4. Stabilisers

5. Preservatives

6. Trace components

Active components

The active component of a vaccine is known as the vaccine 'antigen'. This is a modified or partial form of the virus, bacteria or the toxin that causes the disease against which the vaccine protects. The vaccine antigen is altered from its original form so that it no longer causes disease but it can produce an immune response. There are a number of ways this is achieved

Attenuated live viruses

Natural or 'wild type' viruses cause disease by reproducing themselves many millions of times in the body's cells. In some vaccines where live virus is used, the virus has been treated and weakened (attenuated) in such a way that when it is introduced to the body in the form of a vaccine, it induces an immune response without causing severe disease. The advantage of live, attenuated vaccines is that one or two doses usually provide life-long immunity. Examples of attenuated live viral vaccines are the varicella, rotavirus and measles-mumps-rubella (MMR) vaccines.

Inactivated viruses

Some viruses or parts of viruses in vaccines are killed (inactivated) with a chemical such as formaldehyde. The killed virus cannot possibly reproduce itself or cause disease. The advantage of vaccines produced in this way is that the body still recognises the virus and produces an immune response. Because no viral replication occurs, these vaccines can be given to people with weakened immunity. The only disadvantage of these types of vaccines is that, generally, several doses must be given to achieve long-term immunity, but persons with weakened immunity may not respond to even multiple doses.

Examples of inactivated vaccines are the inactivated poliomyelitis, influenza and hepatitis A vaccines.

Part of the virus or bacterium

Hepatitis B, Haemophilus influenzae type b (Hib),and human papillomavirus (HPV) vaccines are examples of vaccines where only part of the virus or bacterium is used. The part of the virus or bacterium required to 'induce immunity' is identified and separated from the part which causes disease symptoms. In the case of hepatitis B, the vaccine is composed of a protein that resides on the surface of the virus. In the case of the Haemophilus influenza type b (Hib) vaccine, only the outer coat (polysaccharide) is used joined on (conjugated) to a protein so that the immune system responds to it. These vaccines can be administered to people with weakened immunity, although, if the person's immune system is too weak, they may not develop a satisfactory immune response

Toxin produced by bacteria

Some vaccines are manufactured by chemically inactivating specific bacterial toxins. The inactivated toxin is then referred to as a toxoid and used to produce a vaccine, for example, diphtheria and tetanus-containing vaccines. In the case of tetanus infection, exposure to very little tetanus toxin is sufficient to cause disease, whereas only a small amount of the tetanus toxoid in the vaccine will induce a good immune response and cannot cause disease. Having tetanus infection does not induce a long-term im-

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mune response and non-immune individuals who contract tetanus must be fully vaccinated to protect against future exposure. The only way to be protected against tetanus and diphtheria is to be vaccinated using several doses of the appropriate vaccine.

Adjuvants

Adjuvants are used to enhance the immune response to a vaccine. They include various aluminium salts such as aluminium hydroxide, aluminium phosphate and potassium aluminium sulphate (alum). One way adjuvants are thought to improve the immune response is by keeping the antigen(s) near the injection site so that they can be readily accessed by cells of the immune system. The use of aluminium adjuvants in vaccines generally means that less antigen per dose of vaccine is required, and in some cases, fewer vaccine doses are needed. The presence of adjuvants in vaccines can often be associated with the local reactions that occur at the injection site after vaccination. Aluminium salts, in small amounts, have been added to certain vaccines for about 60 years and a recent review of all the available studies of aluminium-containing diphtheria, tetanus and pertussis vaccines (either alone or in combination) found that there was no evidence that aluminium salts in vaccines cause any serious or long- term adverse events. The exposure to aluminium from vaccines is far less than that received from diet or medications, such as some antacids. Although aluminium containing vaccines have been associated with local reactions and less often, with the development of subcutaneous nodules at the injection site, other studies have reported fewer reactions with aluminium-containing vaccines than those without aluminium (more details on adjuvants will be published in the next WER)

Diluents

A diluent is a liquid provided separately and used to dilute a vaccine to the proper concentration prior to administration. This is usually sterile saline or sterile water.

Stabilisers

Additives are used as stabilisers and help maintain a vaccine's effectiveness by keeping the antigen and other vaccine components stable during storage. Stabilisers prevent the vaccine components from adhering to the side of the vaccine vial. Examples of additives include lactose and sucrose (both sugars), glycine and monosodium glutamate (both of which are amino acids or salts of amino acids) and human or bovine (cow) serum albumin (both proteins). Gelatin, which is partially hydrolysed collagen, usually of bovine (cow) or porcine (pig) origin, is added to some vaccines as a stabiliser.

Preservatives

Preservatives are used to prevent fungal and/or bacterial contamination of vaccines and are present in some but not all vaccines. Originally, preservatives were introduced to prevent bacterial contamination of multi-dose vials. The preservatives used include thiomersal (also known as thimerosal), phenoxyethanol and phenol. Thiomersal is a mercury-containing compound. Phenoxyethanol is an aromatic ether alcohol and is also used as a preservative in many cosmetics. There has been one case report suggesting that this preservative may be associated with eczema. However, this link has not been supported in other studies. Phenol is an aromatic alcohol used as a preservative in very few vaccines. Preservatives have been used in many vaccines and worldwide there have been very few serious adverse events associated with the use of these preservatives.

Trace components

Trace components are the remaining minute quantities of substances that have been used in the early stages of the production process of individual vaccines. Depending on the manufacturing process used this may include trace amounts of cell culture fluids, egg proteins, yeast antibiotics or inactivating agents. Usually, only minute traces of these substances are detected in the final vaccine product. Antibiotics are sometimes used during the manufacturing process to ensure that bacterial contamination does not occur during the manufacturing process. Neomycin and/or polymyxin B are used in the manufacture of vaccines such as varicella (chickenpox) vaccines, some influenza vaccines, DTPa-combination vaccines and measles-mumps-rubella vaccine. Gentamicin is used in the manufacture of some influenza vaccines. Any individual with a severe allergy to any antibiotic or chemical who presents for vaccination should be appropriately assessed by the immunisation provider. The product information relating to each vaccine must be scrutinised for specific vaccine components before administering any vaccine to these individuals. Inactivating agents are used during the manufacture of killed and toxoid vaccines. The bacteria, virus or toxin is inactivated during the manufacturing process but the antigenic components remain intact. The residual amount of these inactivating agents, for example formaldehyde or glutaraldehyde, in the final vaccine is very small. Certain vaccines, such as influenza vaccines, may contain traces of egg proteins as the virus to be used for the vaccine is grown in actual chicken eggs before it is inactivated. Measles and mumps (but not rubella or varicella) vaccine viruses are grown in chick embryo tissue cultures and it is now recognised that MMR (and MMRV) vaccines contain negligible amounts of egg protein and can be safely given to children with egg allergy, even anaphylactic egg allergy. Other vaccines, such as the hepatitis B vaccines, hepatitis B-combination vaccines and human papillomavirus (HPV) vaccines, are manufactured using yeast. Production steps such as filtering and centrifugation greatly reduce the amounts of all of these products in the final vaccine; however, trace amounts may still be present.

Allergies to vaccines or vaccine components

Vaccines rarely produce allergy or anaphylaxis. Overall, the total risk of anaphylaxis in children and adolescents after one vaccination has been reported as <1 case per one million doses. Antibiotics, gelatin and egg proteins are the components most often implicated in these allergic reactions. Yeast has only rarely been associated with vaccine-related allergic reactions. In addition, people allergic to latex are potentially at risk, not from the vaccine itself but the presence of latex in the equipment used to hold the vaccine such as vaccine vial stoppers (bungs) and syringe plungers. Very few vaccine bungs contain natural latex. The product information sheet should be consulted to check for the presence of latex. It is important that immunisation providers assess each individual for a history of allergies and previous reactions to vaccines prior to giving any dose of vaccine.

Source-Vaccine components,

available from *http://www.ncirs.edu.au/immunisation/fact-sheets/vaccine-components-fact-sheet.pdf*

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

Table 1: Vaccine-preventable Diseases & AFP

02nd – 08th February 2013 (06th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2013	Number of cases during same week in 2012	Total number of cases to date in 2013	Total number of cases to date in 2012	Difference between the number of cases to date in 2013 & 2012
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01	00	00	00	00	00	00	00	01	00	09	09	%
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	03	00	01	00	00	00	00	00	00	04	00	23	05	+ 360 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	02	01	+ 100.0 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	02	06	10	- 40.0 %
Tuberculosis	73	26	32	08	09	00	00	00	30	177	110	905	1165	- 22.3 %

Table 2: Newly Introduced Notifiable Disease

02nd – 08th February 2013 (06th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2013	Number of cases during same week in 2012	Total number of cases to date in 2013	Total number of cases to date in 2012	Difference between the number of cases to date in 2013 & 2012
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	06	00	06	01	01	01	01	01	06	23	94	395	531	- 25.6 %
Meningitis	01 CB=2	01 MT=1	01 GL=1	00	01 AM=1	00	00	00	05 RP=5	09	12	113	98	+ 15.3 %
Mumps	01	00	00	00	00	00	00	00	02	03	76	151	484	- 68.8 %
Leishmaniasis	00	00	11 HB=11	00	00	00	02 AP=2	00	00	13	44	120	111	+ 08.1 %

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.

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.

Data Sources:

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

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008. .

Dengue Prevention and Control Health Messages

Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them free of water collection.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

02nd – 08th February 2013 (06th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	75	960	3	19	0	2	1	17	0	9	1	15	0	1	0	6	0	0	**23**
Gampaha	28	499	1	15	0	4	0	8	0	0	1	12	0	4	0	24	0	0	**20**
Kalutara	23	202	5	25	0	5	0	12	4	4	5	40	0	1	2	3	0	0	**15**
Kandy	28	181	0	5	0	0	0	0	0	0	0	3	0	1	0	3	0	0	**9**
Matale	9	57	0	15	0	0	0	0	0	0	0	3	0	1	0	8	0	0	**8**
NuwaraEliya	0	25	0	7	0	0	0	1	0	1	0	0	0	8	0	0	0	0	**8**
Galle	8	64	1	7	0	3	0	0	0	1	0	13	0	7	0	2	0	0	**37**
Hambantota	5	41	1	7	0	0	0	2	0	1	1	31	1	13	1	24	0	0	**33**
Matara	3	62	1	3	0	2	0	1	0	3	1	11	0	4	0	50	0	1	**29**
Jaffna	5	115	0	23	0	1	0	61	0	0	0	0	0	81	0	3	0	0	**8**
Kilinochchi	0	4	0	3	0	2	0	2	0	1	0	1	0	0	0	0	0	0	**0**
Mannar	3	29	2	9	0	1	1	13	0	11	0	4	0	3	0	0	0	0	**40**
Vavuniya	1	12	0	11	0	5	0	2	0	3	0	6	0	0	0	0	0	0	**75**
Mullaitivu	0	13	0	1	0	0	0	1	0	0	0	2	0	2	0	0	0	0	**0**
Batticaloa	5	76	0	18	0	1	0	0	0	0	1	4	0	0	0	3	0	0	**50**
Ampara	1	17	1	21	0	0	0	1	0	0	0	3	0	0	1	1	0	0	**43**
Trincomalee	1	31	0	7	0	0	0	0	0	0	0	11	0	1	0	0	0	0	**8**
Kurunegala	18	836	0	26	0	6	0	7	0	0	0	11	1	7	5	7	0	0	**23**
Puttalam	0	196	0	9	0	1	0	2	0	1	0	2	0	0	0	0	0	0	**0**
Anuradhapu	3	94	0	10	1	6	0	0	0	0	3	17	0	4	0	2	0	0	**11**
Polonnaruw	4	44	0	17	0	0	0	3	0	0	1	40	0	0	1	3	0	0	**0**
Badulla	0	55	0	17	0	0	0	3	0	0	0	3	0	4	0	5	0	0	**12**
Monaragala	1	31	0	10	0	1	0	3	0	0	1	16	0	5	0	9	0	0	**18**
Ratnapura	15	156	5	54	8	47	0	5	0	2	2	27	2	4	6	54	0	1	**33**
Kegalle	18	157	0	5	4	7	0	2	0	2	0	8	0	9	3	27	0	0	**18**
Kalmune	11	132	2	12	0	1	0	0	2	4	0	3	0	0	0	2	0	0	**31**
SRI LANKA	**275**	**4089**	**22**	**356**	**13**	**93**	**02**	**146**	**06**	**43**	**17**	**286**	**04**	**160**	**19**	**236**	**00**	**02**	**21**

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 08th February, 2013 Total number of reporting units 336. Number of reporting units data provided for the current week: 69
A = Cases reported during the current week. **B** = Cumulative cases for the year.

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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.**

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