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EPI schedule - New directions

With the achievements of EPI in Sri Lanka, tetanus toxoid vaccination schedule during pregnancy will have some changes in the near future. This article discusses these new changes and the rationale behind it.

Tetanus is a fatal infectious disease caused by toxigenic strains of *Clostredium tetani*. The disease is an important public health problem especially in tropical underdeveloped countries. In these countries tetanus morbidity and mortality are dominated by maternal and neonatal tetanus.

Tetanus is readily preventable through immunization. Tetanus toxoid (TT) containing vaccines (DPT, DT, aTd and TT) are included in the EPI schedule for infants and children, adolescents and for pregnant mothers. In addition, TT is routinely used in wound management.

Protection against tetanus is incomplete after a single dose and in a majority of recipients the protective concentration of antitoxin is achieved only after completion of 2 doses. A third dose induces immunity in almost 100% of those immunized.

Immunity to tetanus is antibody-mediated and depends upon the ability of antitoxins to neutralize tetanoplasmin, the most important toxin of *C. tetani*. Recovery from clinical tetanus does not result in protection against the disease in the future. Immunity can be obtained only by active or passive immunization. Maternal antitoxin passes via the placenta to the foetus. Hence, if the mother receives the booster or a second dose of a primary series of immunization at least two weeks before the delivery, then both the mother and the newborn are protected against birth associated tetanus infection. If the last dose is given within two weeks of the delivery then there may not be an adequate time period to obtain the optimum booster response by the time of the childbirth. If a mother presents during the last two weeks of her pregnancy, however, ignoring the delay, vaccine should be administered to obtain whatever the booster response that can be achieved and also considering this as a measure of protection against tetanus in future deliveries.

Duration of protection: The antibody concentration and avidity and also the duration of protection depend on a number of factors. These include the age of the vaccinee and the number and intervals between vaccine doses. It is considered that three DPT vaccine doses in infancy will give 3-5 years' protection, a further dose or booster (e.g. in early childhood) will provide protection into adolescence. One or two more boosters will induce immunity well through adulthood – probably for a duration of 20-30 years.

Goals of tetanus control should primarily be i) elimination of maternal and neonatal tetanus and ii) achievement and sustenance of high coverage of DPT 3 and appropriate boosters in order to prevent tetanus in all age groups. Strategies will depend on the disease burden of the community and gaps in the vaccine programme for example, in countries where maternal and neonatal tetanus is high a 'high-risk approach' to cover all women in child bearing age would be appropriate. Although there may be good vaccine coverage during infancy the subsequent boosters during childhood and adolescence may have deficiencies. In such instances school based immunization programmes coupled with strategies to capture non-school going children would be necessary to prevent tetanus among younger and adult age groups.

Prevention of tetanus in case of injury: Decision to immunize against tetanus after an injury depends on the severity of the injury and reliability of the history of previous tetanus vaccinations. If the last dose was administered more than 10 years ago (or 5 years in the case of severe injuries) it should be given. In addition, passive immunization using tetanus antitoxin, preferably of human

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origin, may be needed for prophylaxis (e.g. in cases of dirty wound in incompletely immunized individuals).

However, in most instances after an injury, previous immunization history is not explored and treating physicians prefer to give a single dose or more of tetanus toxoid. Non-availability of a written immunization record is the main reason.

Tetanus vaccination schedules: The choice of primary schedule as well as the number and timing of boosters could vary and depends on many factors including national epidemiological, programmatic and economic considerations.

WHO recommend that ideally an individual should receive a total of 5 doses of tetanus toxoid containing vaccines in childhood, followed by a 6th dose in early adulthood which will provide added assurance of protection throughout the childbearing years, and possibly for life. Even after many years an interrupted primary or booster dose schedule need not be restarted, and can be simply continued with the next dose that is due. It would be very useful if all doses received over an individual's lifetime are documented. A lifelong immunization card will be invaluable.

The exact timing of the booster doses could be flexible to suit the most appropriate health service contacts. WHO recommendation is that in addition to primary immunization of three doses during infancy a booster dose at age 4-7 years followed by another booster in adolescence (at age 12-15 years) should be given. This totals to 5 tetanus toxoid containing vaccine doses. In addition to the childhood vaccination programme, an extra dose to adults will further assure long-lasting, possibly life-long protection. Therefore, WHO recommends a 6th dose for adults, for example at the time of the 1st pregnancy or during military service.

For previously non-immunized adolescents and adults, WHO recommend 2 doses of tetanus toxoid to administer at least 4 weeks apart and a 3rd dose at least 6 months after the second and, subsequent boosters at least 1 year apart. Those who receive their first tetanus vaccine doses as adolescent or adult will require only administration of appropriately spaced 5 doses of tetanus toxoid to obtain long-term protection.

Current practice in Sri Lanka: Sri Lanka has a very good coverage for immunization during infancy and childhood. It is almost 100% for vaccines during infancy. Under the EPI, infants get tetanus toxoid containing DPT vaccine at 2, 4 and 6 months of age and then at 18 months the 4th dose. Before school entry at 5 years they receive the tetanus toxoid containing DT vaccine as the booster. Again at 12-15 years of age, preferably at Grade 7 children receive aTd vaccine. This totals up to 6 tetanus toxoid containing vaccines.

In addition, during the first pregnancy, mothers receive two doses of tetanus toxoid with 6-8 weeks apart and a single dose of tetanus toxoid during each subsequent pregnancy up to a total of five doses.

Future directions: According to the WHO recommendations a total of six doses of tetanus toxoid containing vaccines would provide almost lifelong immunity against tetanus. In Sri Lanka the current immunization during pregnancy has been designed primarily because people in child bearing age group were not covered by current EPI schedule during their childhood and adolescent ages. The second reason was that, even if they would have received tetanus vaccine, there were no records to prove that. Administration of tetanus toxoid during pregnancy has been commenced in Sri Lanka in 1969 and will be shortly celebrating the completion of four decades. The launch of EPI in Sri Lanka was in 1978 and those who had a desirable coverage with immunization against tetanus during infancy and childhood are now reaching their child bearing age. This means that these pregnant mothers are having an adequate- probably a life long immunity against tetanus. For the same reasons, these mothers need no administration of tetanus toxoid during pregnancy. The main barrier to implement this would be the availability of proof of immunization.

An algorithm for tetanus toxoid vaccination during pregnancy

Documented immunization history									Pregnancy				
DPT @ 2 mo.	DPT @ 4 mo.	DPT @ 6 mo.	DPT @ 18 mo.	DT @ 5 yrs	aTd @ 12 yrs	One or more TT following trauma @ any age	Last dose within past 10 yrs?	Additional TT-b during past 10 yrs	1st	2nd	3rd	4th	5th
← 06 or more doses →							Yes	No	☒	☒	☒	☒	☒
← 06 or more doses →							No	Yes	☒	☒	☒	☒	☒
← 06 or more doses →							No	No	TT-b	☒	☒	☒	☒
← Don't know/ Incomplete [less than 06 doses] →							—	—	TT1 TT2	TT3	TT4	TT5	☒

TT- b = TT booster; ☒ = vaccine not indicated

Based on these new developments EPI schedule for pregnant mothers in Sri Lanka will change in near future. If any pregnant mother is having an immunization record to prove that she has received a total of six doses of tetanus toxoid containing vaccines according to the EPI schedule and/or following trauma, and the time since last tetanus vaccination is 10 years or more, then they will receive one booster dose of tetanus toxoid during the first pregnancy. Further tetanus vaccinations during subsequent pregnancies are not necessary. Even this booster dose is not necessary if she has had a total of 6 doses of tetanus toxoid containing vaccines and also fulfils one of the following criteria: i) time since last vaccine is less than 10 years; ii) had one more booster dose during pregnancy or after trauma within the last 10 years. All the other pregnant mothers, i.e. those who have not had six doses of tetanus toxoid containing vaccines according to the national EPI schedule/ after trauma need administration of tetanus toxoid according to the existing schedule. In the light of these new changes it is essential to strengthen school based immunization and also to keep a life long record of all vaccines administered. Primary healthcare staff should educate parents and all others that the current child health record should be considered as a life long record. It should be updated whenever a new vaccine dose is administered and also should be readily available whenever healthcare including ante-natal care is sought.

Reference:

WHO (2006). Tetanus Vaccine. WHO Position Paper. *Weekly epidemiological record*; 81: 198-208.

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Table 1: Vaccine-preventable Diseases & AFP

15th - 21st November 2008 (47thWeek)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	01 GM=1	00	00	00	00	00	00	00	00	01	02	89	77	+15.6%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	01	00	-
Measles	00	00	01 HB=1	00	00	00	00	00	02 RP=2	03	04	108	76	+42.1%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	35	32	+09.4%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	46	44	+04.5%
Tuberculosis	32	16	49	03	14	00	17	00	00	131	173	7575	8872	-14.6%

Table 2: Newly Introduced Notifiable Disease

15th - 21st November 2008 (47thWeek)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Chicken-pox	12	17	09	01	06	12	01	12	11	81	50	4968	3085	+61.0%
Meningitis	03 CB=1 KL=2	01 ML=1	04 HB=2 MT=2	00	00	08 KR=6 PU=2	02 PO=2	02 BD=2	08 RP=1 KG=7	28	20	1199	668	+79.5%
Mumps	01	05	05	01	08	05	00	03	08	36	29	2682	1979	+35.5%

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.

Table 3: Laboratory Surveillance of Dengue Fever

15th - 21st November 2008 (47th Week)

Samples	Number tested		Number positive *		Serotypes									
					D_1		D_2		D_3		D_4		Negative	
	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH
Number for current week	00	03	00	01	00	00	00	01	00	00	00	00	00	00
Total number to date in 2008	124	160	09	25	00	00	06	10	01	09	00	00	02	00

Sources: Genetech Molecular Diagnostics & School of Gene Technology, Colombo [GT] and Genetic Laboratory Asiri Surgical Hospital [AH]

* Not all positives are subjected to serotyping.

NA= Not Available.

Data 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.

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

15th - 21st November 2008 (47th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encepha-litis		Enteric Fever		Food Poison-ing		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Re-ceived Timely*
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	16	1486	10	264	0	15	8	174	0	139	16	997	1	7	3	110	0	0	**85**
Gampaha	5	900	4	214	0	20	1	57	0	104	3	780	0	7	3	179	0	7	**64**
Kalutara	3	440	9	313	0	13	1	69	0	40	22	620	0	4	0	43	0	2	**83**
Kandy	8	293	7	302	1	9	2	63	0	99	12	492	2	95	2	126	0	2	**84**
Matale	7	153	8	212	0	4	0	51	0	16	16	739	0	2	1	30	0	0	**83**
Nuwara	0	28	3	262	0	4	6	249	1	168	3	67	1	43	0	107	0	1	**85**
Galle	0	100	5	190	1	21	1	18	0	45	12	417	1	15	0	8	0	5	**82**
Hambantota	2	96	7	123	0	8	0	8	4	16	3	112	4	96	0	16	0	1	**91**
Matara	6	324	8	210	0	14	0	36	0	15	6	464	5	226	0	14	0	1	**82**
Jaffna	0	58	0	146	0	4	0	255	0	17	0	1	0	156	0	38	0	0	**0**
Kilinochchi	0	0	0	151	0	0	0	1	0	4	0	2	0	0	0	2	0	0	**0**
Mannar	0	25	2	24	0	6	0	157	0	0	0	0	0	1	0	16	0	0	**25**
Vavuniya	0	12	5	69	0	3	1	15	0	22	1	6	0	1	0	5	0	0	**100**
Mullaitivu	0	0	0	55	0	0	0	16	0	13	0	0	0	1	0	9	0	1	**0**
Batticaloa	0	86	8	203	0	7	1	31	0	29	1	10	0	0	0	95	0	16	**82**
Ampara	0	33	0	260	0	0	0	9	2	285	1	24	0	0	0	13	0	0	**57**
Trincomalee	2	181	3	119	0	1	0	13	0	14	1	31	0	17	0	15	0	0	**80**
Kurunegala	8	341	8	240	0	16	0	52	0	27	25	671	0	30	0	80	1	9	**84**
Puttalam	2	283	6	142	0	10	0	157	1	41	0	66	0	38	1	33	0	5	**78**
Anuradhapu	0	119	5	146	0	10	0	12	0	16	0	240	0	11	0	15	0	3	**68**
Polonnaruw	0	64	5	135	0	1	0	28	0	23	0	71	0	1	0	21	0	0	**86**
Badulla	3	96	5	489	2	9	4	125	1	112	1	69	5	118	4	157	0	1	**80**
Monaragala	0	60	1	349	0	4	1	51	0	121	0	93	3	105	0	54	0	2	**91**
Ratnapura	2	278	13	396	0	33	0	52	0	80	4	228	0	80	3	58	0	0	**72**
Kegalle	8	416	4	303	0	25	3	84	1	17	12	552	0	68	13	507	0	1	**91**
Kalmunai	1	38	14	283	0	2	0	14	0	16	0	3	0	3	2	27	0	0	**54**
SRI LANKA	**73**	**5910**	**140**	**5600**	**4**	**239**	**29**	**1797**	**10**	**1479**	**139**	**6755**	**22**	**1125**	**32**	**1778**	**1**	**57**	**74**

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 29 November, 2008 Total number of reporting units =309. Number of reporting units data provided for the current week: 230

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