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A Strategic Approach for Sustained Elimination of Maternal-Neonatal Tetanus in Sri Lanka

Introduction

Maternal and neonatal tetanus (MNT) was a leading life-threatening condition caused by unclean delivery practices and poor hygiene in umbilical cord care. When tetanus develops, it is a disease with 100% mortality rates, particularly in the absence of adequate medical care and remains a preventable yet persistent threat in low-resource settings. Sri Lanka successfully achieved Maternal and Neonatal Tetanus Elimination (MNTE) in 2016 through targeted immunization efforts among pregnant women. However, to sustain this remarkable achievement and prevent any resurgence, maternal tetanus toxoid (TT) vaccination has been integrated into the broader adult tetanus toxoid immunization framework. This article explores the rationale, public health benefits, and implementation strategies for this integration to ensure comprehensive tetanus protection for both women and newborns.

Background and Rationale

Tetanus is caused by a neurotoxin produced by the bacteria *Clostridium tetani* whose natural habitat is soil while it can enter and thrive in oxygen-deprived environments such as contaminated wounds or the umbilical cord when cut with unsterile tools and whose spores are widespread in these environments. The neurotoxin Tetanospasmin enters peripheral nerves travels to the central nervous system, and binds irreversibly to nerve terminals. By blocking the release of inhibitory neurotransmitters, Tetanospasmin causes unopposed muscle stimulation, leading to characteristic muscle rigidity and spasms starting in the jaw muscles. As it progresses, even mild stimuli can provoke widespread tetanic seizure-like activity, and autonomic instability, which can lead to labile blood pressure and heart rate, diaphoresis, bradyarrhythmias, and cardiac arrest.

Prevention of tetanus is possible through the administration of tetanus toxoid, which stimulates the production of specific antibodies. To prevent maternal and neonatal tetanus, it is crucial to administer tetanus toxoid to the mother before or during pregnancy and ensure hygienic delivery practices and proper umbilical cord care. Sri Lanka's success in eliminating MNT has relied heavily on a robust antenatal immunization schedule. Nevertheless, low immunization coverage with tetanus toxoid leading to declining immunity, particularly among women of reproductive age, poses ongoing risks.

The global shortage of tetanus toxoid vaccines

Globally, immunization efforts face significant challenges, with childhood vaccine coverage declining between 2019 and 2021, particularly in low-income and lower-middle-income countries. In 2023, 14.5 million infants missed their first dose of the Diphtheria, Tetanus, and Pertussis (DTP) vaccine, leaving them vulnerable to preventable diseases. This decline is compounded by supply challenges, such as Sanofi Pasteur's discontinuation of the Diphtheria and Tetanus Toxoids Adsorbed (DT) vaccine in 2020, which has further strained vaccine availability.

Way back in 2001, the Centers for Disease Control and Prevention (CDC) had asked US physicians to delay the last dose of the DTP vaccine for children until they were four years old because of a nationwide shortage of tetanus and diphtheria toxoids in the United States. The vaccine was in short supply because the pharmaceutical company Wyeth Lederle stopped producing tetanus and diphtheria toxoids, leaving Aventis Pasteur as the only US supplier. Added to that CDC requested that all routine tetanus boosters for adults and adolescents be delayed until April 2002. In addition, the tetanus toxoid (TT) vaccine has faced shortages in recent years due to several factors, including production issues and companies leaving the vaccine market.

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Sanofi Pasteur, the vaccines division of the French multinational pharmaceutical company has decided to discontinue production and distribution of Diphtheria and Tetanus Toxoids Adsorbed (DT) and is withdrawing its licenses in all countries. The last lot was manufactured in October 2020 with an expiry date of April 2023. Sanofi expects to exhaust available supply by the end of 2022. In 2024, the United States was facing a potential shortage of tetanus toxoid vaccines due to the discontinuation of the tetanus toxoid vaccine, TdVax, by nonprofit vaccine makers such as Mass Biologics. Grifols, the sole distributor of TdVax, anticipates depleting its supply by June 2024, leading to significant constraints. In response, the CDC recommends healthcare providers administer the Tdap vaccine, which offers protection against tetanus and pertussis (whooping cough), as an alternative to Td. To manage the shortage, CDC has implemented temporary ordering controls across both public and private sectors. Vaccine shortages like this often arise from issues such as companies exiting the vaccine market, manufacturing challenges, and inadequate stockpiles.

To address these challenges, integrating maternal tetanus toxoid into the adult tetanus immunization program ensures continuous protection for women and their newborns, while aligning with global strategies for lifelong tetanus immunity.

Benefits of Integration

Sustaining maternal and neonatal tetanus elimination (MNTE) relies on continuous immunization among women of childbearing age to protect newborns from neonatal tetanus. Administering adult booster doses further ensures immunity, reducing the risk of tetanus across all age groups. Considering the cost, human resources and logistics, integrating tetanus vaccination with other health services enhances cost-effectiveness and efficiency by optimizing resources, streamlining vaccine delivery, and minimizing the burden on healthcare workers. Moreover, a robust adult immunization program strengthens the resilience of the health system, enabling it to address gaps in immunization coverage and respond effectively to outbreaks.

Recommended Immunization Strategy

As per the National Guideline on Immunization against Tetanus, currently, the number of doses required and the timing of boosters during pregnancy will depend on the past immunization history of the pregnant mother with the tetanus-containing vaccines. Immunization of pregnant mothers who have non-vaccinated or partially vaccinated for tetanus in infancy and childhood as per the Expanded Programme of Immunization (EPI) schedule is different to those of pregnant mothers who have fully vaccinated during their infancy and childhood. For those who have not received the tetanus-containing vaccines, 2 doses are given during the first pregnancy; first dose after completion of 12 weeks of gestation, second dose six to eight weeks after the first dose, and before the delivery. A third dose during the second pregnancy after 12 weeks gestation and 4th dose during the third pregnancy, fifth dose during the fourth pregnancy after 12 weeks of gestation in each pregnancy. For those pregnant mothers who have documented evidence of receipt of tetanus-containing vaccines as per the national EPI, one booster dose is adequate if the gap between the sixth dose or any current Tetanus-Toxoid Containing Vaccine (TTCV) and the present pregnancy is more than ten years. If the gap is less than ten years the pregnant mother does not need to be vaccinated with TTCV during pregnancy as per the national EPI. In a case where the pregnant mother has received 3 doses following an exposure to the organism/spore within five years, at government hospitals the practice was to consider that she is fully immunized against tetanus.

Programmatic Considerations

To implement this strategy effectively, several critical areas must be addressed. To enhance tetanus prevention, it is essential to update national immunization guidelines to integrate maternal tetanus toxoid vaccination within the broader adult TTCV schedule. Ensuring an uninterrupted vaccine supply chain is equally critical, requiring accurate forecasting and efficient procurement systems to maintain availability. Healthcare worker training plays a pivotal role in this effort by equipping providers with the knowledge and skills needed to deliver integrated immunization services effectively. Additionally, fostering community awareness is vital to highlight the importance of tetanus vaccination for all adults, with an emphasis on maternal protection to safeguard both mothers and newborns.

Conclusion

Integrating maternal tetanus toxoid into Sri Lanka's adult TTCV program is a vital and strategic step toward sustaining MNTE and achieving comprehensive tetanus immunity across the lifespan. By aligning with WHO recommendations, optimizing healthcare delivery, and strengthening monitoring systems, Sri Lanka can continue to safeguard its population, particularly vulnerable women and newborns, from tetanus-related mortality.

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Table 1: Selected notifiable diseases reported by Medical Officers of Health 25th – 31st Jan 2025 (05th Week)

RDHS	Dengue Fever		Dysentery		Encephalitis		En. Fever		F. Poisoning		Leptospirosis		Typhus F.		Viral Hep.		H. Rabiies		Chickenpox		Meningitis		Leishmania-		Tuberculosis		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	A	B	T*	C**
Colombo	225	1201	2	4	1	1	0	0	1	1	18	49	0	2	1	1	0	0	15	47	1	4	1	1	42	176	**100**	**100**
Gampaha	162	880	4	5	0	5	0	1	37	38	23	99	0	1	0	1	0	0	23	87	2	18	1	7	28	108	**100**	**100**
Kalutara	29	207	0	3	0	1	0	0	0	1	5	84	0	0	0	2	0	0	9	62	0	4	0	0	7	65	**71**	**75**
Kandy	80	350	2	11	0	1	0	0	2	4	6	50	2	11	0	1	0	0	9	43	0	2	3	7	11	102	**100**	**100**
Matale	45	219	2	3	0	1	0	0	0	1	8	29	0	0	1	4	0	0	3	10	0	0	2	23	1	10	**100**	**100**
Nuwara Eliya	6	30	5	11	0	1	0	2	6	40	9	26	2	11	0	0	0	0	13	30	0	1	0	0	5	38	**100**	**100**
Galle	53	264	1	7	0	2	0	0	2	17	16	85	4	16	0	0	0	0	17	74	3	18	0	0	2	58	**100**	**100**
Hambantota	22	149	1	4	0	2	0	0	1	2	11	44	1	6	0	0	0	0	8	33	0	2	2	33	5	25	**100**	**100**
Matara	59	187	1	2	0	1	0	0	3	3	9	63	2	2	0	1	0	0	0	28	1	6	6	13	4	24	**100**	**100**
Jaffna	39	247	0	10	0	1	0	2	2	5	7	89	15	91	0	0	0	1	6	22	0	3	0	0	6	25	**100**	**93**
Kilinochchi	3	25	1	3	0	0	0	1	0	1	2	19	0	4	1	1	0	0	0	0	0	0	0	0	0	5	**100**	**100**
Mannar	12	57	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	2	3	1	6	0	0	3	4	**100**	**100**
Vavuniya	3	13	3	3	0	0	0	0	1	1	2	15	0	1	0	0	0	0	0	1	2	3	0	2	0	5	**75**	100
Mullaitivu	1	10	0	1	0	0	0	1	0	0	4	22	1	2	0	0	0	0	1	3	0	2	0	0	0	2	**83**	**100**
Batticaloa	53	299	27	42	2	3	0	0	0	2	1	11	0	1	1	7	0	0	5	29	0	5	0	1	2	11	**100**	**100**
Ampara	4	24	0	1	0	1	0	0	0	0	0	14	0	1	1	1	0	0	3	9	0	2	1	2	1	5	**100**	**100**
Trincomalee	22	141	8	15	0	1	0	0	6	13	12	27	1	2	0	0	0	0	4	19	1	6	1	3	0	8	**100**	**100**
Kurunegala	18	147	1	5	0	3	1	1	0	15	10	122	2	9	0	0	0	0	16	76	3	22	12	60	8	41	**100**	**100**
Puttalam	22	130	1	4	0	0	0	0	0	0	2	71	0	6	0	1	0	0	8	27	2	13	1	2	12	29	**100**	**100**
Anuradhapura	22	114	0	3	0	2	0	0	5	6	13	91	1	4	0	4	0	0	7	31	1	7	21	112	7	34	**96**	**100**
Polonnaruwa	8	29	0	6	0	0	0	0	0	1	7	31	0	0	1	6	0	0	5	24	0	0	6	33	0	4	**100**	**96**
Badulla	26	123	0	2	0	1	0	0	0	0	6	48	0	4	3	7	0	0	4	46	2	6	0	1	6	23	**100**	**100**
Monaragala	20	123	0	1	0	1	0	0	0	0	19	78	2	9	1	2	0	0	2	9	1	13	2	15	3	13	**100**	**100**
Ratnapura	58	294	1	14	0	1	0	2	1	5	25	195	0	6	0	0	0	0	7	43	2	17	2	9	9	42	**95**	**100**
Kegalle	24	178	4	13	0	2	0	0	3	10	22	86	0	1	0	1	0	0	14	80	0	4	0	5	3	32	**91**	**100**
Kalmunai	9	70	0	1	0	0	0	0	0	4	3	17	0	0	0	0	0	0	3	31	1	4	0	0	4	15	**100**	**100**
SRILANKA	**102**	**5511**	**64**	**174**	**3**	**31**	**1**	**10**	**70**	**170**	**242**	**1470**	**33**	**190**	**10**	**40**	**0**	**1**	**184**	**867**	**23**	**168**	**61**	**329**	**169**	**904**	**97**	**99**

Source: Weekly Returns of Communicable Diseases (esurvillance.epid.gov.lk). T=Timeliness refers to returns received on or before 31st Jan, 2025 Total number of reporting units 358 Number of reporting units data provided for the current week: 358 **C****-Completeness

A = Cases reported during the current week. B = Cumulative cases for the year.

Table 2: Vaccine-Preventable Diseases & AFP

25th - 31st Jan 2025 (05th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2025	Number of cases during same week in 2024	Total number of cases to date in 2025	Total number of cases to date in 2024	Difference between the number of cases to date in 2025 & 2024
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	01	00	01	00	00	00	00	01	01	07	07	0%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	02	00	00	01	00	00	00	01	00	04	04	24	22	9.1 %
Measles	00	00	00	00	00	00	00	00	00	00	15	04	107	-96.2 %
Rubella	00	00	00	00	00	00	00	00	00	00	00	00	01	-100%
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	01	00	0 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Japanese Enceph-alitis	01	00	00	00	00	00	00	00	00	00	00	03	01	200 %
Whooping Cough	01	00	00	00	00	00	00	00	00	01	00	04	00	0 %

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

NA = Not Available

Take prophylaxis medications for leptospirosis during the paddy cultivation and harvesting seasons.

It is provided free by the MOH office / Public Health Inspectors.

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**

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