WEEKLY EPIDEMIOLOGICAL REPORT

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Identified complications of COVID-19 Part I

The new, or "novel" coronavirus, is a new strain of coronavirus that belongs to the β-coronavirus genus which had not previously been detected in humans. The pathogen was successfully isolated on January 12th, 2020 and named the 2019 novel coronavirus (2019-nCoV). This infectious disease has developed as an outbreak with severe morbidity, which was first reported from Wuhan, China, on 31st December 2019 and it has been declared as a public health emergency of international concern by WHO on January 30th, 2020. The vulnerability of the spread of this new coronavirus is more and this pandemic has been found to have spread throughout Asia and across the world. The number of deaths is rising quickly. According to WHO data, as of 16th April 2020, the total confirmed cases in the world were 1,991,562 with 130,885 deaths. Of the 242 confirmed cases, seven deaths have been reported from Sri Lanka. The pathogen of COVID-19 has posed a serious threat to global public health.

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. CoV is an enveloped RNA virus that is ubiquitous in humans, other mammals, and birds. It can cause respiratory, digestive, liver and nervous system disorders. It can be more severe for some people and can lead to breathing difficulties. Patients with complications were more likely to report pharyngeal pain, dyspnea, dizziness, abdominal pain, and anorexia. Some patients have developed significant respiratory distress within a short period especially children who can quickly progress to Acute Respiratory Distress Syndrome (ARDS). In some severe cases, the disease rapidly progressed to septic shock, refractory metabolic acidosis, and coagulation disorders, eventually followed by multiple organ failure, leading to death.

Pulmonary Complications:

In more severe cases, one third (approximately 33%) of infection has led to severe ARDS which is strongly associated with mortality. The median interval from the onset of initial symptoms to dyspnea or significant symptom aggravation was ranging between 1 to 20 days. Previous studies conducted consistently suggest that pulmonary fibrosis is one of the serious complications in patients with COVID-19 infection. This infection causes damages to most type II alveolar cells in the normal lung tissue. Also, the use of mechanical ventilation in the treatment of patients with the infection can aggravate the injury of alveolar cells.

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After alveolar cell injury, transforming growth factor-β (TGF- β) released in tissue promotes lung repair. Virus infection often leads to excessive activation of the TGF-β pathway, which leads to the occurrence of pulmonary fibrosis. Chest radiographs show invasive pneumonic infiltrates in both lungs. The lung images of most patients have shown abnormal characteristics in which lesions developed in multiple lobes, most of which were dense, and ground-glass opacity co-existed with subsegmental consolidation or cord-like shadows. Imaging which showed focal or patch-like shadows or reticular exudates has rapidly progressed to diffuse consolidations in some patients. Lung CT scans have shown infiltration shadows with a "large white lung" in more severe cases. Evidence shows that some critically ill patients have got pneumothorax also. Factors that increase the risk of developing ARDS and death include older age, neutrophilia, elevated lactate dehydrogenase level, and elevated D-dimer levels.

Extra pulmonary Complications:

Coronavirus disease 2019 can cause viral pneumonia with additional extra pulmonary complications. Based on clinical reports, significant acute and chronic cardiovascular complications of pneumonia with COVID-19 infection are common and result from various mechanisms, including relative ischaemia, systemic inflammation, and pathogen-mediated damage. Acute cardiac injury has been reported in 7% to 20% of patients. Some patients' cardiac biomarkers such as troponin I levels were elevated, occurred diffuse biventricular myocardial oedema and ejection fraction was declined due to acute cardiac injury which is strongly associated with mortality. Patients with high troponin levels showed a higher incidence of complications such as ARDS, malignant arrhythmias, acute renal injury, electrolyte disturbances like hyperkalaemia, hypoproteinemia and acute coagulopathy. Coronavirus disease 2019 is associated with a high inflammatory burden that can develop vascular inflammation, myocarditis, and cardiac arrhythmias among patients. Cardiomyopathy has been reported in critically ill patients. It is unknown whether it is a direct cardiac complication of COVID-19 or due to overwhelming clinical illness. Myopericarditis with systolic dysfunction has been reported in a patient without signs/symptoms of pneumonia 1 week after the resolution of upper respiratory tract symptoms. A case of cardiac tamponade has been reported in a patient with a previous history of myopericarditis associated with COVID-19. The pathogenesis of cardiac involvement associated with SARS-CoV-2 reflects a process of replication and dissemination of the virus through the blood or the lymphatic system from the respiratory tract. SARS-CoV-2 could also trigger an exaggerated inflammatory response that can cause myocardial injury, and this could justify the use of corticosteroids to attenuate inflammation. Most of the patients with cardiac injury were older and more likely to have chest pain. Comorbidities including hypertension, diabetes, coronary heart disease, cerebrovascular disease, chronic heart failure, chronic obstructive pulmonary disease, and cancer were present more often among patients with a cardiac injury. Patients with cardiac injury had a higher incidence of in-hospital mortality rates.

Evidence suggests that patients with severe COVID-19 have got cytokine storm syndrome as a complication. Patients who were critically ill have been commonly reported higher plasma concentrations of proinflammatory cytokines like Interleukin-2, IL6, IL7, IL8, IL10, Granulocyte-Colony Stimulating Factor, Interferon-γ Inducible Protein 10, Monocyte Chemoattractant Protein 1, Macrophage Inflammatory Protein 1-α and Tumour Necrosis Factor-alpha and inflammatory markers (e.g., C-reactive protein, serum ferritin), probably leading to activated T-helper-1 (Th1) cell responses. Lymphopenia (in CD4+ and CD8+ T cells), and decreased IFNγ expression in CD4+ T cells are associated with severe COVID-19. Dysregulated and exuberant immune responses have been shown to potentially cause lung damage and diminished survival. This cytokine storm was associated with disease severity likely through increased pulmonary pathology, T cell depletion, and CD4+ T cell dysfunction. This likely represents a type of virus-induced secondary Haemophagocytic Lymphohistiocytosis (sHLH), which may be fatal. Cardinal features of sHLH include unremitting fever, cytopenias, and hyperferritinaemia.

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… to be continued

Table 1: Selected notifiable diseases reported by Medical Officers of Health 21st– 27th Mar 2020 (13th Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishmaniasis		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	12	2684	0	13	0	4	0	4	0	14	0	57	0	0	0	2	0	0	1	139	0	14	0	0	**58**	**97**
Gampaha	8	1593	0	3	0	0	0	4	0	19	0	37	0	1	0	1	0	0	0	190	0	8	0	17	**52**	**92**
Kalutara	9	906	0	5	0	4	0	3	0	1	0	94	0	7	0	1	0	0	4	138	0	9	0	0	**60**	**88**
Kandy	19	1078	0	6	0	1	0	7	0	6	0	15	0	36	0	3	0	0	1	93	0	14	0	25	**62**	**99**
Matale	6	430	0	3	0	2	0	1	0	4	1	16	0	2	0	2	0	1	2	34	0	1	2	120	**60**	**100**
NuwaraEliya	5	128	1	10	0	0	0	0	0	0	0	13	3	39	1	2	0	0	2	43	0	6	0	0	**24**	**100**
Galle	2	939	0	10	0	8	0	2	0	12	0	159	0	20	0	1	0	0	2	183	0	15	0	2	**60**	**86**
Hambantota	0	255	0	4	0	0	0	1	0	37	0	53	0	13	0	2	0	0	4	99	0	8	0	231	**76**	**94**
Matara	0	351	0	7	0	3	0	0	0	0	0	81	0	4	0	6	0	0	0	68	0	5	0	117	**49**	**72**
Jaffna	15	1705	0	35	0	0	0	14	0	16	0	10	1	426	0	0	0	1	1	59	0	3	0	0	**34**	**93**
Kilinochchi	0	103	1	16	0	0	0	3	0	0	0	6	1	17	0	0	0	0	0	4	0	4	0	4	**67**	**100**
Mannar	0	117	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	1	0	3	0	0	**42**	**95**
Vavuniya	0	226	0	4	0	0	0	3	0	0	0	30	0	1	0	0	0	0	0	10	0	3	0	1	**60**	**100**
Mullaitivu	0	61	0	4	0	0	0	3	0	1	0	10	0	3	0	0	0	1	0	2	0	0	0	5	**40**	**77**
Batticaloa	23	1959	0	36	0	2	0	0	0	4	0	13	0	0	0	0	0	1	2	55	0	9	0	1	**62**	**98**
Ampara	0	279	0	8	0	1	0	0	0	0	0	22	0	0	0	1	0	0	6	63	1	8	0	4	**64**	**100**
Trincomalee	14	2116	0	4	0	0	0	0	0	1	0	11	0	2	0	0	0	0	0	64	0	5	0	0	**51**	**88**
Kurunegala	1	644	0	5	0	4	0	2	0	29	0	54	0	10	0	1	0	0	4	225	0	8	0	153	**55**	**93**
Puttalam	0	331	0	6	0	1	0	2	0	1	0	15	0	9	0	0	0	1	2	54	0	16	0	2	**66**	**93**
Anuradhapur	0	305	0	8	0	1	0	2	0	19	0	114	1	12	0	1	0	1	4	92	0	16	0	81	**56**	**88**
Polonnaruwa	1	181	0	4	0	0	0	0	0	0	0	54	0	0	1	12	0	0	3	66	0	8	0	86	**63**	**98**
Badulla	1	354	0	8	0	2	0	2	0	3	3	101	0	17	0	6	0	0	2	88	0	15	0	4	**61**	**100**
Monaragala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Ratnapura	6	565	1	29	0	11	0	1	0	13	1	268	0	9	0	9	0	0	1	106	0	32	0	38	**51**	**95**
Kegalle	5	345	0	5	0	3	0	1	0	12	1	68	0	16	1	4	0	0	2	100	0	11	0	9	**60**	**98**
Kalmune	0	797	0	25	0	2	0	0	0	1	0	2	0	2	0	0	0	0	1	151	0	11	0	0	**78**	**100**
SRILANKA	**127**	**18452**	**3**	**258**	**0**	**49**	**0**	**56**	**0**	**193**	**6**	**130**	**6**	**647**	**3**	**54**	**0**	**6**	**44**	**2127**	**1**	**232**	**2**	**900**	**57**	**90**

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 27th March , 2020 Total number of reporting units 356 Number of reporting units data provided for the current week: 266 C**-Completeness

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

Table 2: Vaccine-Preventable Diseases & AFP

21st – 27th Mar 2020 (13thWeek)

Disease	No. of Cases by Province									Number of cases during current week in 2020	Number of cases during same week in 2019	Total number of cases to date in 2020	Total number of cases to date in 2019	Difference between the number of cases to date in 2020 & 2019
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	00	00	00	00	00	00	00	00	02	09	25	- 64 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	00	00	00	00	02	01	00	00	00	03	05	54	94	- 42.5 %
Measles	00	00	00	00	00	00	00	00	00	00	05	21	43	- 51.1 %
Rubella	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
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	01	03	04	0 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	- 25 %
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	06	07	200 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	01	02	20	- 90 %
Tuberculosis	00	00	00	00	00	00	00	00	00	00	118	1455	1997	- 27.1 %

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

NA = Not Available

Number of Malaria Cases Up to End of March 2020,

03

All are Imported!!!

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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