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## Brief Communication

# COVID-19 Preparedness at the National Hospital of Sri Lanka: A report related to the COVID-19 Pandemic

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**Key words**: **COVID-19, pandemic, National Hospital of Sri Lanka, preparedness, staff affected**

## Abstract

Being the largest hospital in the country; rather, the largest hospital in Southeast Asia and the final referral centre of the country, the NHSL played a key role in managing COVID-19 patients during the crisis situation in the country. NHSL developed Level 2 intermediate care capacity, Level 1 bed capacity, oxygen bed capacity, HDU bed capacity and ICU bed capacity to cater to the increased patient load. This was mainly during the period when the number of oxygen-dependent patients, as well as critically ill COVID-19 patients was going up.

During this whole period, all the staff from the top to bottom of the NHSL played an important role and gave immense support to manage the crisis. Consumables, logistics and medical equipment supply were managed from government supplies as well as from donations. The NHSL was able to treat each and every COVID-19 patient with dignity, hence the services provided by the NHSL were not criticized in the mass media or on social media.

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## Background

On 31st December 2019, the Chinese health authorities alerted the World Health Organization about several cases of pneumonia in Wuhan City of Hubei Province due to a previously unknown virus [1]. One week later, on 7th January 2020, it was confirmed that the causative organism was a coronavirus, and it was named "2019-nCoV" (novel coronavirus) [1]. An increasing number of cases infected with 2019-nCoV were reported from the Hubei Province, a number of other provinces and cities in China and several other countries [2]. A Sri Lankan who returned from Wuhan City was admitted to the National Institute of Infectious Diseases, Angoda on 24th January 2020 with symptoms and signs of respiratory illness [2]. Two Chinese nationals from Wuhan, visiting Sri Lanka, were admitted on 25th January with a similar illness [2]. All three cases were females and were having very mild

illness at the time of admission. One Chinese lady became PCR positive for SARS-CoV2 on 27th January 2020 [2].

Coronaviruses are a large family of viruses transmitted between animals and people. They can cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and severe acute respiratory syndrome (SARS) [2]. The pandemic of COVID-19 led to a global health crisis in our time [3].

The COVID-19 situation in Sri Lanka was classified as 3 waves (4).
1st Wave – 27th January 2020 to 03rd October 2020
2nd Wave – 04th October 2020 to 14th April 2021
3rd Wave – 15th April 2021 up to August 2021

The National Hospital of Sri Lanka (NHSL), founded in 1864, is the largest hospital in Sri Lanka as well as in Southeast Asia. It is the final referral center of the country and is located in the heart of Colombo city (5).

The NHSL consists of 3250 beds, 18 well-equipped intensive care units (119 Beds), 19 high dependency units, 21 surgical theatres and 93 wards (6). The average out-patient visits to the NHSL are about 939 per day and it averages 750 admissions per day (7). An average of 5000 surgeries are performed every month in the hospital (7). The NHSL provides special trauma and emergency care services to the majority of people in the Western Province through an efficient and well-organized accident and emergency care unit (5).

The NHSL hosts the country's one and only neuro-trauma centre. This centre provides its unique services 24/7 (5). The accident and trauma unit of this hospital is the largest of its kind in Sri Lanka and rendered an immense service during the country's 30 year long civil war (5). In 2020, the hospital provided services for 202,424 in-ward patients and 343,611 outpatients (7).

At present, more than 7600 employees are working at the NHSL and they belong to a wide range of service categories (7). The NHSL features many medical subspecialties in health care and most of these specialties are only available at the NHSL. The service recipients of the NHSL spans the entire country.

## Objectives

1. To assess the preparedness of the NHSL for the COVID-19 pandemic
2. To describe the situation of COVID-19 patients at the NHSL
3. To describe the staff affected by COVID-19 at the NHSL

## COVID-19 Case Load Managed at NHSL

Table 1 illustrates the number of COVID-19 patients treated, number of COVID-19 deaths and number of tests performed at the NHSL to detect COVID-19.

Table 1: Number of COVID-19 patients treated, number of COVID-19 deaths and number of tests performed at the NHSL

| Indicator | 1st Wave | 2nd Wave | 3rd Wave |
|---|---|---|---|
| No. of patients treated | 788 | 2456 | 5785 |
| No. of deaths | 02 | 23 | 321 |
| No. of PCR tests performed | - | 1750 | 25202 |
| No. antigen tests performed | - | - | 98,352 |

During the 1st wave and the early phase of the 2nd wave, confirmatory PCR tests were performed at the Medical Research Institute (MRI). The PCR Laboratory of the NHSL was started in the mid-part of the 2nd wave. The number of COVID-19 patients in the1st wave of about 8 months duration was 788 and increased by more than 3 times over the next 5 months i.e., the 2nd wave and subsequently more than doubled in the initial 4 months (up to August 2021) of the 3rd wave.

Figure 1 demonstrates how the patient load and deaths increased at the NHSL during the three waves of the COVID-19 pandemic.

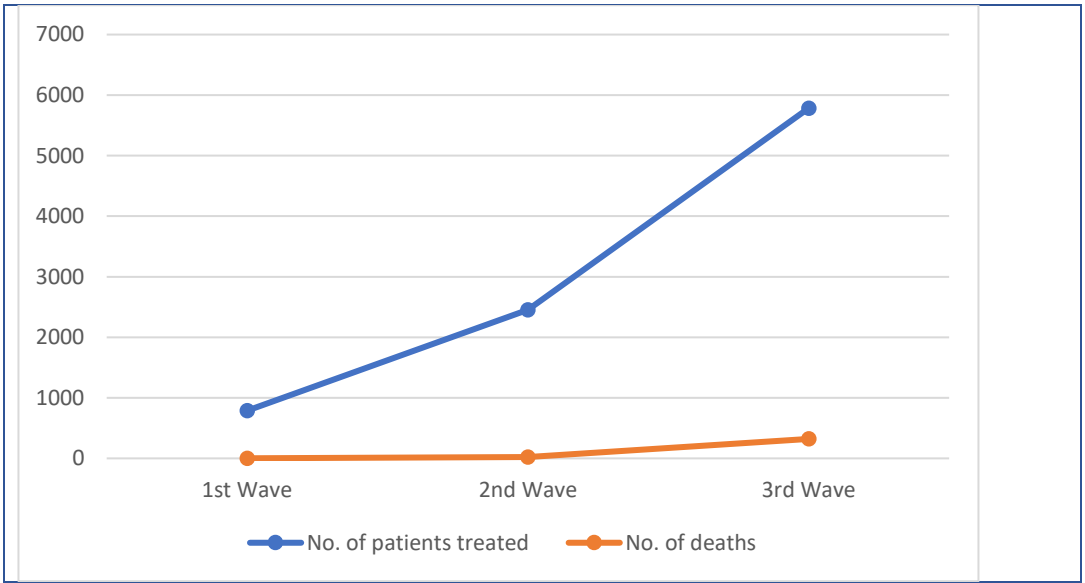


Figure 1: Distribution of COVID-19 patients and COVID-19 deaths at the NHSL

## Hospital Preparedness

It is evident from the manner in which the COVID-19 patient load increased from the 1st wave to the 3rd wave, that the facilities to treat COVID-19 patients also needed to be increased. However, the NHSL was able to manage this huge burden without interrupting routine services.

### 1st Wave

- An immediate stakeholder meeting was called by the Deputy Director General (DDG) of the NHSL as soon as the first COVID-19 patient was reported in Sri Lanka on 27.01.2020. A COVID-19 steering committee was established with the participation of all Deputy Directors, relevant Specialist Medical Officers and relevant unit heads.

- A fever corner was established at the Out-patient Department (OPD) and all suspected cases of COVID-19 were assessed in this area. Temporary isolation facilities were established at the OPD and the Emergency Treatment Unit (ETU) under the care of `Emergency Physicians. Patients were transferred to medical wards after the initial medical management and suspected COVID-19 patients were transferred to a dedicated COVID-19 ward.

- A dedicated medical ward (Ward 14) was established as a Level 1 COVID-19 ward (40 beds with oxygen) to treat suspected and confirmed COVID-19 patients. In addition a dedicated High Dependency Unit (HDU) with 04 Beds for COVID-19 patients was established at Ward 14. The Medical Intensive Care Unit (MICU) with 07 Beds was identified for the ICU care of COVID -19 patients. Operation Theatre D was assigned for surgeries on COVID-19 suspected or COVID-19 confirmed patients.

- At the same time, infection control, health education and health promotion activities to prevent COVID-19 infection were strengthened. Hand washing facilities were established at the entrances to the NHSL as well as at the entrances to the units. Adequate amounts of alcohol hand rub and the required dispensers were distributed to all the Wards/Units.

- A COVID-19 risk assessment committee was established in the hospital to assess the risk of staff and patients contracting COVID-19 and to make decisions on quarantine (home/institutional), testing (PCR/later rapid antigen) and special leave approval for COVID-19 patients and quarantined staff.

- An on-call roster of Consultant Physicians from both the Professorial and non-professorial Medical Units was implemented. Samples from suspected COVID-19 patients were sent to the MRI for confirmation.

- Personal Protective Equipment (PPE) required for staff such as polythene aprons, disposable overalls, caps, face shields, surgical face masks, N-95 masks, shoe covers, boots etc. were ordered from the Medical Supplies Division (MSD) as well as received as donations.

- Frequent infection control training and training on proper PPE wearing and doffing was conducted by the Infection Control Unit of the NHSL.

- Isolation rooms were established in each and every medical ward for suspected COVID-19 patients. Some isolation rooms were previously allocated for tuberculosis (TB) patients and such suspected TB patients were advised to transfer to Chest Hospital, Welisara.

- Additional medical equipment like portable ventilators, BI-PAP machines, sucker machines, multi-para monitors etc. were got down from the government supplies as well as in the form of donations and provided to the medical units.

- Visitors were restricted to one per patient according to the guidelines of the MoH. Clinic drugs were issued for three months at a time for patients according to the instructions of the MoH. Handheld infra-red digital thermometers were provided to the Accident Service, OPD and clinics etc.

- Checklists were introduced for on-admission and in-ward deaths of patients with a clinically highly suspicion of COVID-19. A register of quarantine details of the staff of the NHSL was maintained by the Public Health Unit. The hospital statistics for COVID-19 were uploaded to the national surveillance system for COVID-19 by the Planning Unit of the NHSL daily. Special committees were appointed for COVID-19 preparedness, quarantine, clinic patient management etc.

- Preliminary work for digitalization of the hospital and establishment of PCR and molecular laboratories were carried out as future perspectives.

### 2nd Wave

- Apart from Ward 14, Ward 31 (October 2020) and WD 24 (December 2020) were established as Level 1 COVID-19 wards. COVID-19 bed capacity was increased to 51. The Surgical Intensive Care Unit (SICU) with 08 Beds was established as the second COVID-19 ICU in the NHSL.

- The PCR laboratory was established in a renovated building incorporating the necessary requirements for a PCR laboratory. PCR machines and other major laboratory equipment were obtained as donations from recommended suppliers. Furniture and other equipment were provided from government funds. The PCR laboratory started functioning on 18.01.2021 and has performed over 27,000 tests to August 2021.

- A separate set of staff was allocated to re-organize the distribution of clinic drugs at the NHSL and establish a WhatsApp group among the clinic patients. Clinic drugs were sent to the patients by post with the support of the Postal Department.

Table 2: Development of Bed Capacity to Treat COVID-19 Patients in NHSL

| | 1st Wave | 2nd Wave | 3rd Wave |
|---|---|---|---|
| No. Level 1 Wards | 01 | 03 | 19 |
| No. of Level 1 Beds | 40 | 51 | 697 |
| No. of Oxygen beds | 40 | 40 | 217 |
| No. of HDU beds | 04 | 04 | 95 |
| No. of ICU beds | 07 | 15 | 25 |
| No. of ICC's | - | - | 02 |
| No of ICC beds | - | - | 179 |

## 3rd Wave

- The number of Level 1 COVID-19 wards were increased from one in the 1st wave and three in the 2nd wave to 19 in the 3rd wave by acquiring wards from other sections of the NHSL using a scheduled stepwise approach. Level 1 COVID-19 treatment bed capacity was increased up to 697 during the 3rd wave. HDU beds increased to 95 in the 3rd wave from 04 in the 1st and 2nd waves. There was an increase to 217 oxygen beds (only 40 in the 1st and 2nd waves) by strengthening wall oxygen facilities.

- COVID-19 ICU bed capacity was increased to 25 by establishing an ICU at the Neuro-trauma ETU. Table 2 clarifies how all the types of bed capacity increased during the COVID-19 pandemic up to August 2021.

- Two Intermediate Care Centers (ICC) were established at the Salvation Army Building, Borella and Meethotamulla as Level 2 treatment centres, with a bed capacity of 62 and 77 respectively (total of 139), by mobilizing staff, medicines and medical equipment. An additional 40 beds were allocated from the ICC in Rajagiriya (Level 3) to the NHSL.

- Rapid antigen testing (RAT) was started at the NHSL on 25.11.2021 and over 94,000 tests were performed by the OPD, Wards/Units and at the PCR Laboratory up to August 2021.

- Strengthening of the capacity of medical equipment took place during all 3 waves of the COVID-19 pandemic. However, this was most prominent during the 3rd wave. Table 3 illustrates the development of medical equipment at the NHSL.

Table 3: Development of medical equipment at the NHSL during the COVID-19 pandemic (up to August 2021)

| Equipment | No. available in March 2020 | No. available in August 2021 | % increase |
|---|---|---|---|
| Multi– Monitors | 458 | 625 | 36% |
| Pulse Oxy meters | 332 | 382 | 15% |
| BP Apparatus | 836 | 890 | 7% |
| ECG Machines | 07 | 18 | 157% |
| Nebulizers | 338 | 365 | 8% |
| Ventilators | 154 | 173 | 12% |

| | | | |
|---|---|---|---|
| BIPAP Machines | 05 | 45 | 800% |
| CPAP Machines | 28 | 58 | 107% |
| High Flow Machines | 08 | 48 | 500% |

## Conclusion

Being the largest hospital of the country, rather the largest hospital in Southeast Asia, and the final referral centre of the country, the NHSL played a key role in managing COVID-19 patients during the crisis situation of the country.

The NHSL developed Level 2 intermediate care capacity, Level 1 bed capacity, oxygen bed capacity, HDU bed capacity and ICU bed capacity to cater to the increased patient load. This was mainly during the period when the number of oxygen-dependent patients and critically ill COVID-19 patients were increasing rapidly.

During this whole period, all the staff, from the top to bottom of the NHSL played an important role and rendered immense support to manage the crisis. Consumables, logistics and medical equipment were managed from the government supplies as well as from donations.

The NHSL was able to treat each and every COVID-19 patient with dignity, hence the services provided by the NHSL were not criticized in the mass media or on social media.

## Recommendations

- Even though the NHSL managed a huge number of COVID-19 patients without much interruption to routine services, it is not ideal to use the final referral centre of the country for this purpose as this may compromise lifesaving and finer specialty interventions. As a national policy, it is better to identify hospitals with about 200 bed capacity per 500,000 population in each district to be converted to infectious disease hospitals in an emergency situation. Half of the beds in such hospitals should have wall oxygen facilities.

- Need to develop HDU, ICU and theatre facilities in all Base Hospitals in the country to be utilized for COVID-19 patients.

- Recognition of Ayurvedic Hospitals with a bed capacity of 100 per 1 million population as ICC will reduce the burden on the health system.

- All hospitals above the Base Hospital Level, up to the NHSL, need to improve their liquid oxygen storing capacity. At the same time, the establishment of at least one medical oxygen generating plant per province is useful.

- Promote manufacture of PPE among local suppliers, to avoid undue delay in procurement and to have a continuous and smooth supply of PPE.

- Recognize all donors who made contributions in the difficult time of the pandemic and appreciate them at the central or provincial level.

- Introduce a continuous education programme for all levels of health care workers to update COVID-19 knowledge and to improve the capacity.

- Establish a continuous sentinel surveillance mechanism for COVID-19 through the Influenza-like-Illness Surveillance System to identify sero-type as well.

- Encourage health care workers, who worked hard during the difficult times of the COVID-19 pandemic by appreciations.

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