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Establishment of a Hospital Information Updating System (HIUS) to Augment Hospital Readiness for the 3rd Wave of COVID-19 in Sri Lanka

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Abstract

Timely available quality health information obtained through the regular monitoring systems to monitor the COVID-19 situation in the hospitals is essential to curtail any outbreak of infectious diseases. The main objective of this project was to collect heath information updated regularly through a web-based system in order to assess the readiness to face the 3rd wave of COVID-19 in Sri Lanka. The Hospital Information Updating System (Henceforth referred to as HIUS) was established on 25th May 2021 and an updated report has been created daily since the 1st of June 2021 in order to collect information pertaining to the management of COVID-19. According to the results, all secondary and tertiary care hospitals daily updating their information to the system. According to the 14/06/2021 dashboard, 108 ICU beds, 351 HDU beds and 1868 normal beds were occupied by Covid positive patients. At present, satisfactory number of vacant beds are being maintaining in the government hospitals of Sri Lanka for any future requirement.

Key words: COVID 19, Medical equipment, WHO, Oxygen, Sri Lanka

1. Introduction

Currently, the SARS-CoV-2 virus (Henceforth referred to as COVID-19) is spreading throughout the world resulting higher number of deaths. According to the (World Health Organization (WHO) on 17/06/2021, 176,303,596 patients were reported world while 3,820,026 patients have died (1). At the time of submission of this paper, the health condition is very severe in India, caused by a massive surge of COVID-19 cases and deaths (2). As India's neighbor, Sri Lanka is at a risk of getting similar disaster in the future. At the time of submission of this paper, the situation in Sri Lanka is becoming more severe vis a vis the 1st and 2nd waves. In the 1st wave, from 27.01.2020 to 03.10.2020, 3396 cases and 13 deaths were reported while during the 2nd wave, from 04.10.2020 to 14.04.2021, 92341 cases and 591 deaths were reported. The wave 3rd, from 15.04.2021 to 31.05.2021, 90627 and 880 deaths reported, thereby showcasing a higher death rate (0.95) (3).

As the COVID-19 pandemic created a serious challenge to the healthcare system, heath information is essential to face this disaster (6). Health System Information is highly valuable asset required to manage any ongoing disaster situation related to the risk management of COVID-19 (4). Timely available quality health information is essential to curtail any outbreak of infectious diseases (4). In addition, information is necessary for Policy Makers to take crucial decisions within short period of time in a disaster situation (5). Ministry of Health (Henceforth as MOH) is the main governmental body to exercising the essential requirement of combating COVID-19. As such, the MOH is required to be informed of the number of currently available facilities in government hospitals; more so as hospitals were being equipped on a continuous basis through donations and local government funds. However, there was no viable system in place to collect and update information in real time at the Ministry of Health. Thus, as the main COVID-19 management unit, Deputy Director General (DDG) Medical Service 1 of MOH faced many difficulties to collect pertaining information repeatedly. Ergo, a web-based Hospital Information Updating system was established under the guidance of Dr. Lal Panapitiya, DDG 1.

The main objective of this project was to collect updated heath information regularly through a web-based system in order to assess the readiness to face the COVID-19 3rd wave. The final aim was to facilitate all government hospitals according to their requirements in order to manage COVID patients efficiently and effectively.

At present, the Ministry of Health prepared 138 (25,246 beds) intermediate care centers for management of asymptomatic COVID 19 positive patients and 76 (6,457 beds) existing hospitals to manage symptomatic patients (7). There are 130 secondary care hospitals and tertiary hospitals and 474 divisional hospitals which need improvement for the apt management of COVID-19 patients (8). The main aim of the MOH is to facilitate secondary and tertiary care hospitals in which patients are being managed under the guidance of medical consultants.

2. Methodology

Focus group discussion was conducted with the DDG MS 1 in order to identify the necessary information to be included to the system. Through several discussions, the required information was listed out in an excel sheet. The main information listed out were existing Intensive Care Unit (ICU), High Dependency Unit (HDU) and normal patient beds allocated for the management of COVID 19 patient, number of patients occupied by those beds and number of essential equipment available in each hospital to manage COVID patients effectively. Finally, several discussions were conducted with the Information Technology consultants to create a software to collect information from all government hospitals where COVID 19 patients are being managed. The said consultants developed the Health Information Updating System (HIUS) system within a week and handed the system to the MOH without any charge. However, it was a challenge to implement this system as there were 600 individual Hospitals requiring installment of the system. Individualized passwords and usernames were created for each hospital in order to maintain the data security. Provincial COVID-19 coordinators were given the responsibility to implement this system in each hospital above Divisional Hospital type C (The government hospitals in Sri Lanka have divided into categories according to the facilities. Teaching Hospital, Provincial General Hospitals and District General Hospital are considered as tertiary care Hospital. Base Hospital type A and B are considered as secondary care Hospital and Divisional Hospitals are categorized in to type A (>100 beds), B (100- 50 beds, and C (< 50 beds) according to the number of beds. Primary care unit is the smallest institutions wherein only outpatient care service is available). Each hospital was given responsibility to update the system daily through a focal point nominated by the head of the institute.

3. Results

The HIUS system was established on 28th May 2021 and updated report was created daily since 1st of June 2021. Table 1 indicates types of Hospital responded to the HIUS system up to type B Base Hospital.

Table 1 Distribution of Responses of secondary and tertiary care Hospital in Sri Lanka.

Category	Number of Hospitals Available	Number of Hospitals Responded
National Hospital	2	2
Teaching Hospital	10	10
Specialized Hospital	15	15
Provincial General Hospital	2	2
District General Hospital	20	20
Base Hospital - Type A	28	28
Base Hospital - Type B	53	53
Total	**130**	**130**

As per Table 1, it is evident that all secondary and tertiary care hospitals responded to the

HIUS. While the largest number of hospitals comprised of Base Hospitals, larger hospitals such as Provincial General Hospitals, Specialized Hospitals, Teaching Hospitals and National Hospitals also responded to the HUIS where most COVID-19 patients were managed in.

Table 2. Responses of Primary care Hospitals

Category	Responded Hospitals
Divisional Hospital - Type A	30/85
Divisional Hospital - Type B	54/128
Divisional Hospital - Type C	51/259
Total	**135/474**

There are 474 primary care Hospitals distributed all over the country. Each hospital was linked to the HIUS to obtain COVID related information. However only 135 hospitals responded due to shortages in human, physical and technological resources. It is noted that such non-responsiveness did not affect the final result to a great degree as less than 5% of total patients were managed the said Hospitals

Table 3. Distribution of Bed Occupancy in HDU and ICU according to category of hospital as per 14/06/2021

Category	Allocated ICU	Occupied ICU	Free ICU (%)	Allocated HDU	Occupied HDU	Free HDU (%)	Allocated Inward	Occupied Inward	Free Inward
National Hospital	21	16	5(20)	57	42	15(26)	398	275	123 (31)
Teaching Hospital	53	39	14(26)	107	89	18(17)	1101	830	271 (25)
Specialized Hospital	20	8	12((60)	13	7	6(46)	354	289	65(18)
Provincial General Hospital	10	5	5(50)	8	8	0(0)	209	117	92(44)

District General Hospital	35	18	17(49)	117	55	62(53)	1007	654	353 (35)
Base Hospital - Type A	31	13	18(58)	108	67	41(38)	1091	558	533 (49)
Base Hospital - Type B	10	9	1(10)	124	83	41(33)	1371	881	490 (36)
Total	180	108	72(40)	534	351	183(34)	5531	3604	1927 (35)
Divisional Hospital - Type A	0	0	0	17	0	17	1866	952	914
Divisional Hospital - Type B	0	0	0	2	0	2	1154	703	451
Divisional Hospital - Type C	0	0	0	3	2	1	513	316	197
All	180	108	72(40)	556	353	203(57)	9064	5575	3489 (38)

Table 3 shows the allocated number of beds for the management of COVID patients in Hospitals. The majority of all Hospitals in Sri Lanka have allocated beds for COVID-19 patients while simultaneously caring for Non-COVID patients, while the others exclusively care for COVID patients. The MOH have increased the number of allocated beds for COVID patients from each Hospitals as per demand. At the time of the study, there were 72(40%) ICU beds, 203(57%) HDU beds and 3489 (38%) beds available for COVID patients.

Figure 1. Progress of responses by the targeted hospitals with time

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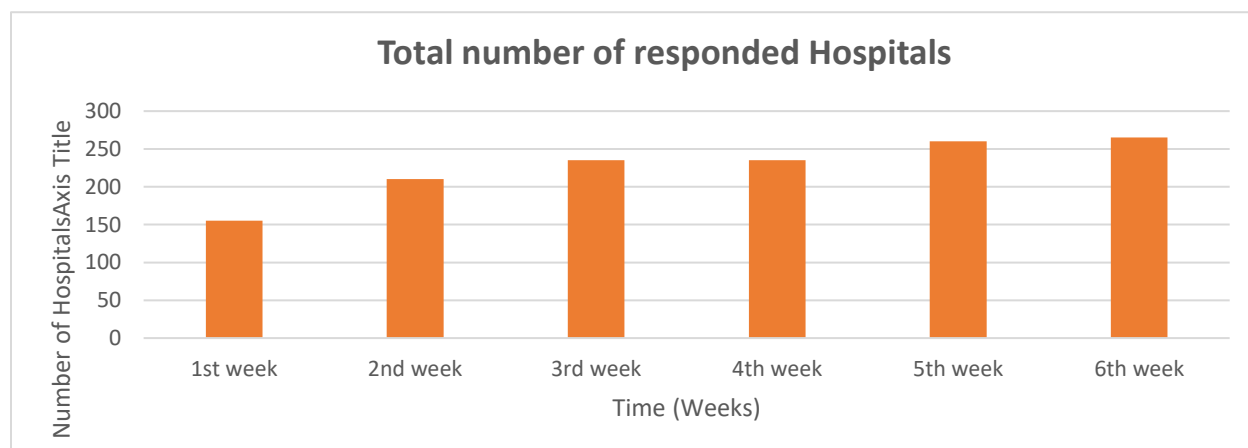
As per Figure 1, at the commencement of the project, only 150 hospitals uploaded relevant information to the HIUS. At the end of the 6th week however, more than 250 hospitals were added to the system including all the secondary and tertiary care hospitals.

Figure 2. Improvement of ICU facilities in Government hospitals
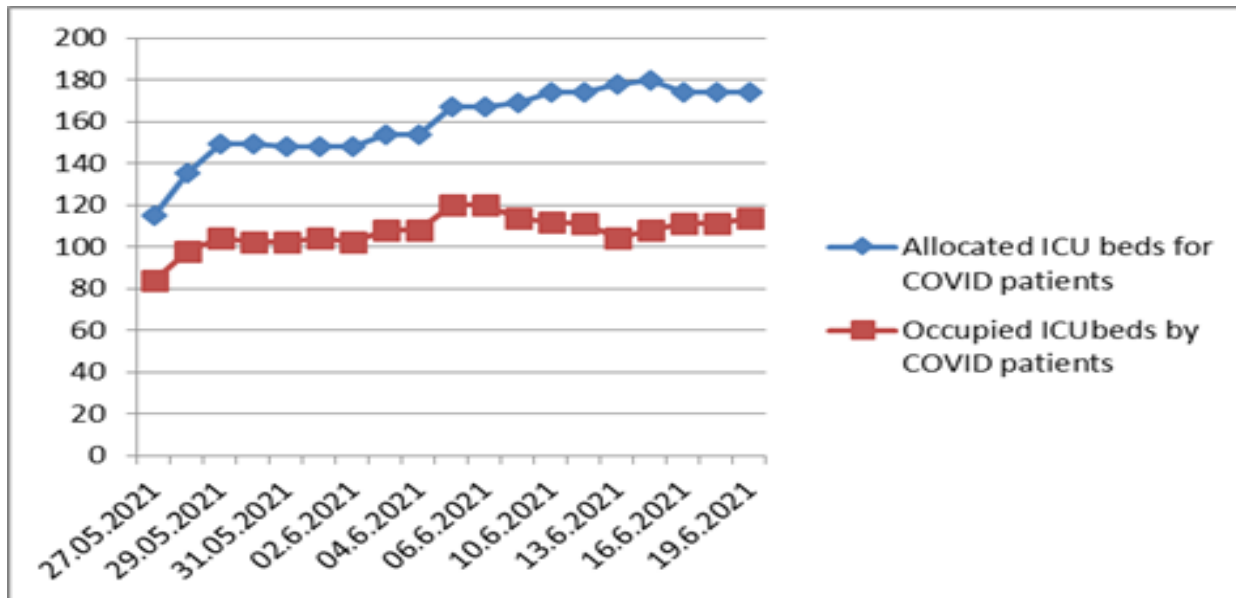
As per figure 2, the requirement of ICU beds increased with time, as such displays the virulence of the new COVID variant delta. The MOH increased ICU beds for COVID patients as per demand in order to provide quality health care service.

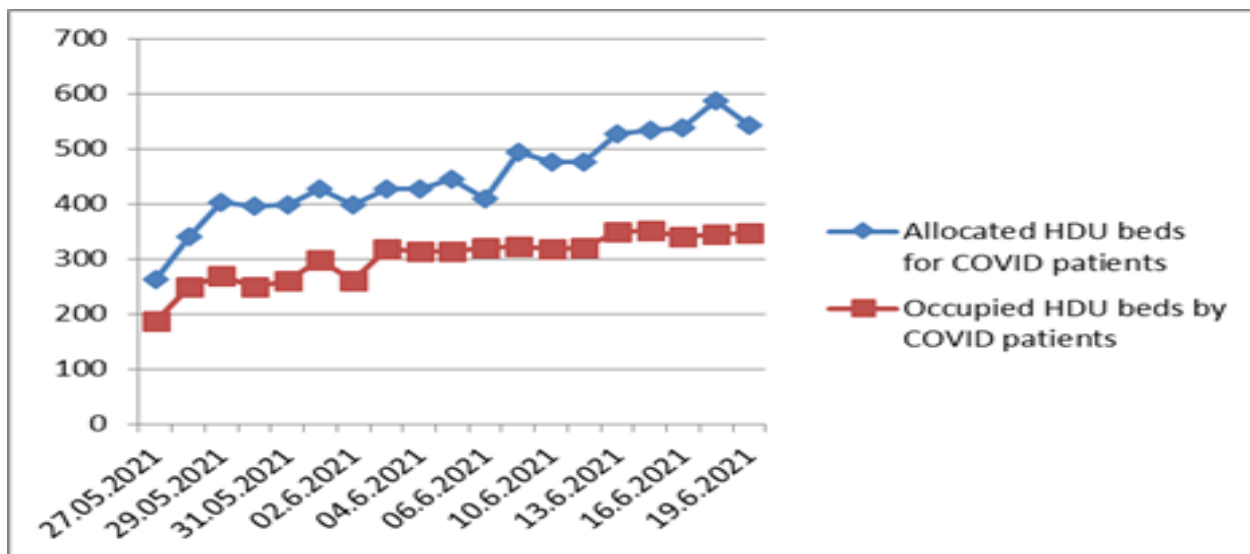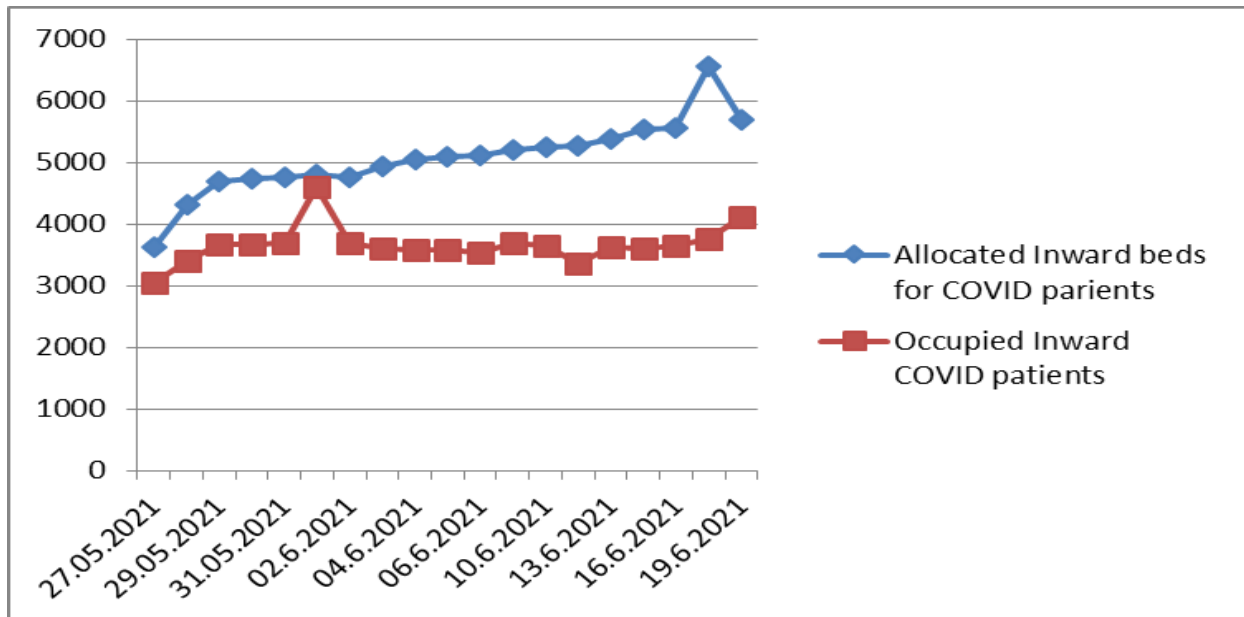**Figure 3. Improvement of HDU facilities in Government hospitals**

Figure 3 shows that the requirement for HDU beds for COVID patients who required oxygen therapy increased with time. As such, the HDU beds capacity has been increased as per demand.

Figure 4. Improvement of inward facilities in Government hospitals

According to the figure 4, number of patients admitted to the COVID wards increased with the time. Necessary steps have been taken by the MOH to increase the bed capacity for COVID patients as per demand.

4. Discussion

With a higher rate of transmission rate than SARS, an increased effort will be needed to combat the worldwide contagion of COVID-19 (9). Health Information plays an important role in managing emergencies such as the current COVID-19 Pandemic, allowing for the assessment of preparedness in Government Hospitals for apt prescriptions. As such, The Director General of Health Services (DGHS) issued a circular to all the Hospitals in order to prepare each Hospital to manage symptomatic COVID-19 positive patients (11).

Before the implementation of the HIUS system, no active and comprehensive system to monitor the COVID-19 situation at a Hospital level existed, and thus the MOH had to request information from each Hospital – which became inefficient and costly when repeated on a daily basis. After the development of the HIUS, the task was automated on 1st of May 2021. As per the Table 1, there are 130 secondary and tertiary care Hospitals in Sri Lanka. It is noted that obtaining relevant information from all the hospitals is of importance, as each Hospital cares for Oxygen dependent COVID-19 patients. Within 2 weeks of implementation of the HIUS, all 130 hospitals uploaded updated information. There are 474 primary care hospitals with inward facilities which are managed by medical officers due to the lack of consultants. As such, if patients require specialist care, they will be transferred to Secondary

or Tertiary care hospitals. From the 474, only 135 Divisional hospitals uploaded relevant information to the system. However, Figure 1 illustrates that the response rate of such hospitals is increasing. Some Divisional Hospitals are located in peripheries where a scarcity of human, structural and technological resources exist. The lack of response did not have a noted effect on the assessment however, as all the oxygen dependent patients were managed by Secondary or Tertiary care hospitals.

According to the table 3, 180 ICU beds were prepared for the COVID-19 patients in government hospitals. However, 108 bed are occupied and 72 beds remain vacant. The DGHS instructed all Heads of Institutions to prepare separate HDU and Wards to manage COVID-19 positive patients in the case of an emergency. Accordingly, all able Hospitals, of them secondary and tertiary care prepared as such. There were 556 HDU beds and 9064 normal beds prepared (Table 3) in relevant hospitals, of which 353 HDU beds are occupied by the patients while 204 HDU beds are vacant and ready if demand persists.

There are more 30,000 beds available in the intermediate care centers to manage asymptomatic patient in the country (7) while 9,064 beds prepared to manage symptomatic patients in all hospitals. From the available hospitals' beds, only 5575 were occupied by the symptomatic patients. However, 3489 beds are vacant and ready to manage the patients. According to the above information, all the hospitals around the country have prepared their hospitals to face this COVID 19 pandemic.

Figure 1- 3 illustrates the improvement of COVID 19 management facilities of said Hospitals as per the reported patient demand, and the maintaince of vacant beds for further demand. Figure 4 shows the district distribution of patient availability, which has been used by the MOH to allocate resources and implement pertaining prescriptions.

5. Conclusions

Implementation of HIUS was a successful project and contributed as an important asset to DDG – MS, facilitating the collection of information related to COVID management. All secondary and tertiary care hospitals update their information to system on a daily basis. According to the database, 180 ICU beds, 534 HDU beds and 5531 normal patient beds are available for the management of COVID-19 patients at the time of submission of this paper. As such, an adequate number of vacant beds are being maintaining for the future requirements or demands.

6. Recommendations

It is recommended to expand this HIUS system to collect COVID related information from intermediate care centers, where asymptomatic COVID patients are managed.

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