

Enhancing Health System Resilience: Practical and Cost-effective Approaches to Face the COVID-19 Pandemic by Base Hospital Udugama Sri Lanka

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Submitted : 26.01.2021

Published : 31.01.2021

<https://doi.org/10.51595/INJCR/11111117>

Abstract

COVID-19 is a pandemic from pneumonia of unknown origin, first reported in Wuhan city China as information extracted from the World Health Organization. It was first reported in Sri Lanka on 27 January 2020 by a Chinese tourist. Handling the COVID-19 situation with scarce recourses within a limited time was challenging for the government hospitals. This paper aims to describe the practical and cost-effective actions implemented at the Base Hospital Udugama to enhance the health system resilience to prepare, respond to, and recover from the COVID-19 pandemic. We did a retrospective evaluation of the COVID-19 control project at the Base Hospital Udugama. The daily interventions carried out at the Base Hospital Udugama to prepare, respond and recover from the COVID-19 pandemic were documented in a journal. Also, we preserved evidence through photographs while collecting data from the routine hospital records. The temporally established COVID-19 coordinating committee managed all the activities. The committee increased awareness among staff and the public, maintained stock of Personal Protective Equipment, established preventive measures, established an isolation unit, arranged community sample collection, continued essential routine healthcare services and distribution of the clinic drugs to the doorsteps of the patients while protecting the Hospital staff against COVID-19. Even though the management of the COVID-19 pandemic was a challenge to the Base Hospital Udugama, with strong leadership and effective coordination with different units and departments within and beyond the hospital, it was possible to manage the response efficiently and effectively.

We recommend enhancing the health system's resilience through timely investments in peripheral hospitals coupled with capacity building targeting multiple hazards, including pandemics.

Keywords: COVID 19, Pandemic, Prevention, Resilience, Preparedness, Response.

1. Introduction

It took nearly three months for COVID-19 to be declared a pandemic on 11 March 2020 by the World Health Organization (WHO), from its first reporting as pneumonia of unknown origin from the Wuhan city, China (1,2). The first case of COVID-19 reported from Sri Lanka on 27 January 2020 was a Chinese woman who traveled from Hubei Province, China (3).

Despite the rapidly rising number of COVID-19 cases globally, Sri Lanka successfully controlled several clusters that emerged in the country (4). Under the Ministry of Health's leadership, the government of Sri Lanka has implemented stringent control measures to respond to this newly emerging global pandemic, such as the Island-wide curfew with a stay-at-home order was imposed, and non-essential services were restricted while maintaining the essential services (5). The government made immense efforts to improve public awareness to manage this unprecedented situation with optimum compliance to recommended preventive practices (6).

Throughout this speedy and rapid global progress of COVID-19, the disease itself created a culture of fear and anxiety everywhere in the world (7). Similarly, in Sri Lanka, there was much fear and anxiety among the general public regarding the pandemic. The nature of disease transmission was unprecedented, and it was challenging to continue

the essential public services, including healthcare service. Therefore, health care service has to adopt special precautions to deal with the new situation and limit the number of positive COVID-19 cases below the country's healthcare capacity. The global shortage of medical supplies, especially personal protective equipment (PPE) due to increase demand and reduce supply, aggravated the situation (8).

The healthcare institutions struggled with COVID-19 related fear and anxiety, mobility restrictions, and scarcity of resources, at least in the initial stages. Many local government healthcare institutions at the peripheral level were not capable of optimally handling the situation while continuing the public's uninterrupted healthcare service during the initial few months of the country's COVID-19 pandemic situation. However, Base Hospital (BH) Udugama (Factbox 1) was able to cater to the increased demands due to COVID-19 while continuing the essential health services during the pandemic. Hence, this retrospective evaluation of the institutional management of the COVID-19 viral outbreak at BH Udugama could provide valuable guidance for the healthcare institutions to prepare and respond to and recover from future current and future pandemics. Hence, this case study documents the efforts initiated by the BH Udugama in the wake of the COVID-19 pandemic.

Factbox 1: Base Hospital Udugama



Figure 1 : Base Hospital Udugama, Sri Lanka

Base Hospital Udugama is one of the type-B base hospitals located in the Nagoda divisional secretariat area in the Galle district of the Southern Province of Sri Lanka. It serves its population with 126-bed strength with a bed occupancy rate is around 80%. The hospital operates a well-established Out Patient Department (OPD) care service and clinic-based care service, 24/7 hour functioning Emergency Treatment Unit (ETU) service, theatre service, and specialized indoor care services. Additionally, there are numerous support services such as blood transfusion service, laboratory service, radiology department, pharmacy department, infection control unit, kitchen department, maintenance unit, and laundry service to provide comprehensive healthcare service for the general public. Hospital administration plays a crucial role in managing all the above sections to ensure quality healthcare service and the planning and quality management units.

2. Methods

We did a retrospective evaluation of the COVID-19 control project at the Base Hospital Udugama. The daily interventions carried out at the Base Hospital Udugama to prepare, respond and recover from the COVID-19 pandemic were documented in a journal. Also, we preserved evidence through photographs. We also gathered data generated through the day-to-day operations of the routine hospital records.

We collected and summarized the information under the following action areas:

- I. Establishment of a COVID-19 coordinating unit with a dedicated team of officers in the Base Hospital, Udugama.
- II. Public awareness regarding the pandemic preventive measures among healthcare staff and service users during the initial stage of the COVID-19 pandemic.
- III. Upgrading of the existing infrastructure and systems to cater to the needs of the COVID-19 pandemic
- IV. Locally lead cost-effective innovations to address the hospital's practical problems during the COVID-19 pandemic.
- V. Logistics management to ensure uninterrupted supply of resources for the hospital
- VI. Transport arrangement
- VII. Distribution of medicine to clinic patients

- VIII. Establishment of isolation ward to manage suspected COVID-19 patients
- IX. PCR Testing
- X. Maintaining uninterrupted patient care service

3. Results:

We elaborated some initiatives under the above action below:

1. Establishment of COVID-19 coordinating unit

The first and foremost task was establishing a coordinating unit with the dedicated staff within the hospital. For that purpose, focus group discussions were conducted with the participation of the in-charges of all healthcare categories, hospital administration, all the consultants, and medical officers at the very beginning.

Eight members were elected as COVID-19 coordinating unit, and since then, they were assigned several responsibilities to coordinate the whole process through the proposed coordinating unit. The team included the medical superintendent as a leader, a consultant, sister in-charge, administrative officer, two senior nursing officers, a nursing officer from Quality Management Unit (QMU), and a nursing officer from Infection prevention and control unit. The COVID-19 coordinating unit was temporarily established in QMU of the Base Hospital Udugama. It was officially informed to all other

departments of the hospital. Team members were given authority to direct all issues regarding COVID-19 to the committee. Then appropriate decisions were made and conveyed to the relevant focal points.

All the preventive measures regarding COVID-19, maintaining stock and logistics of personal protective equipment, reviewing and adhering to new guidelines related to control of COVID-19, awareness and training programs, infection prevention and control activities about COVID-19 and communication, coordination with other stakeholders, and daily supervision of regulated activities were continued under the COVID-19 coordinating unit. Especially the committee has reviewed the progress of the hospital situation regarding COVID-19 daily. Additionally, the wellbeing of patients and every staff category was addressed. Public complaints arising during the hospital's day-to-day operations and practices were taken seriously, and mechanisms were established to address the issues positively and promptly in a reasonable manner.

The hospital was well managed according to the operational guidelines prepared by the COVID-19 coordinating unit based on the technical guideline issued by the Ministry of Health. In order to reduce the spread within the hospital, the staff and visitors were minimized. All the entrances were provided with facilities for handwashing. Successful triaging

was maintained at the OPD, Admission area at the ETU.

Appropriate supervision, communication, and record-keeping were ensured by the COVID-19 coordinating unit.

2. Capacity building and awareness-raising

The COVID-19 coordinating unit organized health education activities, awareness programs, and The rapidly spreading COVID-19 outbreak subjected the community members and healthcare workers from the BH Udugama to considerable pressure. The lack of awareness and experience about the newly-identified disease and the safety measures further aggravated the challenges.

These gaps in relation to the recommended COVID-19 prevention measures to prevent the spread of the disease were identified as high priority needing urgent attention and intervention. Some training requirements among the hospital staff were taking Polymerase Chain Reaction (PCR) samples for COVID-19 testing, transportation of suspected patients, and disinfection of ambulances in collaboration with the public health authorities. A series of awareness-raising programs and hands-on skills training were organized on a regular basis, both in-house as well as by sending teams to the other hospitals with the contribution of the experts from the Teaching Hospital Karapitiya and Teaching Hospital

Elpitiya. The content of the training included wearing PPE, taking PCR sampling, and caring for patients suspected of COVID-19. The contribution of the Department of Virology, Teaching Hospital (TH) Karapitiya for these trainings were instrumental. These education sessions laid the foundation to enlighten the staff of the changing demands to their role during the COVID-19 pandemic and helping them to adapt to these service needs in a step-wise manner. The COVID-19 coordinating unit, through a group of trained nurses, mirrored the above trainings at the local level to ensure the continuity of the maintenance and update of the knowledge and skills needed. The issues and concerns that the staff had concerning the practicality of the training were welcomed and resolved effectively and immediately by the leader of the hospital COVID-19 coordinating team.

Additionally, awareness raining among the general public who use the hospital services was also critical. Using the printed material such as posters and an internal audio sound system, the coordinating team delivered information regarding clinical signs and symptoms, good hygienic behavior, red-flag signs needing staff assistance in a continuous manner.

3. Upgrading of hospital infrastructure and systems

There was a need for the rapid upgrading of the hospital infrastructure and the procedures to cater to the needs of the pandemic. The additional resources needed were mobilized through the hospital maintenance unit, hospital committee, external donations, and government allocations. WHO and national guidelines were used to make environmental adjustments to cope up with the COVID-19 pandemic situation. Following improvements were made under the coordination and leadership of the COVID-19 coordinating unit.

1. Establishing hand washing facilities at the entrance to the hospital and its units.
2. Limiting the number of visitors allowed to one visitor for one patient.
3. Maintaining the physical distance between patients, visitors, and staff.
4. Reduction of congestion especially in the OPD and clinics through establishing dedicated outdoor seating areas under canopies (Figure 2).
5. Establishing a triage desk at the admission area in the hospital to sort out the patients with suspected COVID-19 symptoms
6. Establishing separate area to examine suspected patients identified at the triage by staff wearing appropriate PPE.
7. Establishing disinfection group under the guidance and supervision of infection control unit.
8. Frequent cleaning of commonly used surfaces and objects in the hospital and the disinfection of the ambulances under the supervision of disinfection group.
9. Providing hand sanitiser solution to all hospital staff.
10. Providing hospital overalls and pyjama kits stitched in house for all health staff for the personal protection
11. Enhancing the hospital laundry service by assigning additional healthcare assistants
12. Maintaining staff transport service during the COVID-19 curfew-imposed period

4. Locally-lead cost-effective innovations

The hospital maintenance unit initiated a range of locally-led innovations to improve and modify hospital care aspects with zero or minimal added cost. These dedicated and enthusiastic in-house innovators deliberated day and night despite the pandemic to provide real-life solutions to the practical problems that the hospital faced. Some of their innovations are as follows.

- i. Creation of pedal-operated water taps and hand-sanitizer dispensers to be placed at critical locations

- ii. Establishment of a sample collection booth for collecting PCR samples of the suspected patients
- iii. Establishment of a dedicated communication area with a microphone to facilitate communication with suspected patients identified at the triage and medical officers

Among the above, the novel and cost-effective sample collection booth created by the hospital maintenance unit with the community's support, established to assist the nursing officers in obtaining PCR samples safely, needs a special mention (Figure 3).

5. Logistic management

Since all the consumables and PPE were limited, strict control measures were enforced to maintain the buffer stocks above the critical level to sustain essential services. The demand for PPE was streamlined through the development and distribution of guidelines and promotion of rational use of PPE. The PPE were issued by the surgical pharmacy under the strict supervision of the COVID-19 coordinating unit and only under documented channels. Besides, to improve the supply, the hospital produced their PPE. Parallely, to prevent a shortage of supply, the stocks were monitored and managed meticulously in a strictly

accountable manner. The COVID-19 coordinating unit also maintained buffer stocks.

The hospital mobilized the generous support of the hospital committee and other private organizations to collect raw materials for producing the PPE within the hospital (Figure 4). Also, some private organizations provide their human resources and machinery on a voluntary basis for this process.

Linen face masks, waterproof coveralls, linen overalls, polythene overalls, and face shields were locally prepared within the hospital and as well as outside the hospital with the support of dedicated healthcare personnel and volunteers from the community (Figure 3). All the logistics were managed under the supervision of the COVID-19 coordinating adhering to strict control measures. Meanwhile, the Regional Director of Health Services and the Provincial Director of Health Services provided financial support for the process and supplied some PPE.

6. Transport Arrangement

Transport service for the staff was a critical requirement to sustain the hospital. A bus available at the Provincial Director of Health Services was arranged to transport staff from Galle to Udugama and Hiniduma to Udugama. One ambulance was allocated to the transport of COVID -19 suspected patients and samples to Teaching Hospital Karapitiya.

7. Distribution of Medicine to clinic patients

Clinic drug packs were prepared by the Pharmacy department and were distributed to the residences of the patients with the help of divisional secretariats and postal service in the area. The COVID-19 coordinating unit ensured the coordination and the documentation of the process.

8. Establishment of an isolation ward

The need for an isolation ward to treat patients with respiratory symptoms while minimizing the exposure to health staff was highlighted by many parties since the outset. As per the guidelines available at the moment and as per the opinion of the experts, it seemed impractical to establish such a unit at Base Hospital Udugama. However, it was possible to modify an abandoned ward as an isolation facility for the care of suspected COVID-19 patients. This isolation facility consisted of eight adjustable beds and other essential medical equipment needed to provide care for such patients. Critical care aspects required for isolation care were also addressed with the health staff of the hospital. In addition, a maternity section was added to welcome COVID-19 suspected pregnant mothers. However, the isolation unit was not utilized through most of the pandemic period since the facility proper for maternity care, which was TH Karapitiya, did not exceed its capacity.

Nevertheless, the isolation unit has accepted ten patients as of 31 December 2020, mostly being suspected COVID-19 patients or persons under home quarantine. requiring minor procedures such as wound dressing, suture removing and taking X-Ray as day patients. As of 31 December 2020, ten patients have received services from the isolation unit.

9. Taking PCR samples, transportation of suspected patients and samples, ambulance disinfection

After receiving training on the collection of PCR sampling, BH Udugama contributed to the community sampling of COVID-19. The process was somewhat complicated initially; nevertheless, it improved, as the staff got more experienced. Trained nursing officers collected the samples under the direct supervision of the hospital infection prevention and control unit. At the hospital, a total of 28 samples were obtained, while 60 samples were taken in the community, as per 30 August 2020. Following collection, the test samples were safely transported to the laboratory in Teaching Hospital Karapitiya through a hospital ambulance.

10. Maintaining uninterrupted patient care service with special consideration of clinic patients

All the essential hospital care services continued regardless of the challenging COVID-19 situation.

Steps were taken to limit the number of inward patients by discharging non-essential admissions at the ETU itself, cancelation of routine and elective surgeries, and temporarily cancelation of all dental procedures in the hospital. Routine clinics were not conducted. All registered patients in the clinics, including those of the medical and psychiatric clinics, were served by delivering their medicine to the doorstep through the shared responsibility of the hospital COVID-19 coordinating team, Divisional Secretariat, and Sri Lanka postal service. Selected patients were issued medication for up to three months duration. As of 31 January 2021, a total of 1005 drug packets have been distributed by BH Udugama.

11. Staff safety and wellbeing

Staff safety and wellbeing were critical areas of focus during the COVID-19 response. The hospital's human resources were meticulously managed throughout the pandemic by the rescheduling of shifts and duty rosters. Through the leadership and mediation of the COVID-19 coordinating unit, the concerns and fears of health staff were given prompt attention, and the issues were resolved then and there. The trust and the mutual understanding between the COVID-19 coordinating committee and the health staff and effective communication pathways provided the opportunity to resolve conflicts in a win-win and peaceful manner.

Hospital staff had to dedicate their New Year, religious festivals, and many other personal social events due to the unprecedented COVID-19 pandemic situation. The hospital organized a digital New Year cultural event for all hospital staff using social media. Additionally, for the Vesak full moon day, there was an exhibition of Vesak lanterns constructed by the hospital units within the hospital premises, with strict adherence to the health guidelines. The innovative leave opportunities within the government establishment code to entertain the staff needs who have fully dedicated their lives as the frontline health staff. Further, the needy members of the hospital employees were provided with donations of dry rations and financial assistance through the subscription of hospital staff and well-wishers.

12. Returning to normalcy with health guidance

From 11 May 2020, the government decided to gradually loosen the strict control measures which were held tight for more than two months. A set of health guidelines were provided by the Ministry of Health to resume the essential activities of the society adhering to the health guidelines (6). Similarly, the hospital restarted routine activities while adhering to social distancing and other health measures. The strict adherence to the health guidelines during the normalization process, both among the hospital staff as well as among the general public who receive the services of the

hospital, was also promoted, monitored, and supervised by the COVID-19 coordinating unit.

4. Discussion

The outbreak of COVID-19 was a new experience to the world, Sri Lanka being no exception. It was a highly challenging task to prepare the hospital to manage a pandemic of such nature with the available scarce resources as a Type B base hospital in the rural south of Sri Lanka.

In Sri Lanka, the public sector provides the bulk of inpatient curative care. Also, health is a devolved subject under the 13th amendment. Hence management of some hospitals such as the BH Udugama is performed under the provincial health authorities. According to the bed strength and specialties available, BH Udugama is classified as one of the 48 Type B base hospitals under provincial health authorities in the country (9).

The severity of the COVID-19 disease in those with the infection has overwhelmed healthcare systems and frontline healthcare providers and has exhausted resources, revealing how ill-equipped the world was to handle this pandemic (10,10,11). [Gupta, 2020; IHME COVID-19 health service utilization forecasting team, 2020; Flaxman, 2020]. Globally, the impact of the pandemic on the non-COVID-19 services has been demonstrated

(12). Human and financial resources were the highly challenging resource in hospitals during the COVID-19 pandemic (13,14).

The BH Udugama was a hospital managed with 22 medical officers, 49 nursing officers, and 102 health care assistants. They were, in fact, the greatest asset that we had in the war against COVID-19. The highly dedicated and motivated health staff, well-functioning quality management unit, maintenance unit, committee and public and private, health and non-health stakeholder institutions provided the foundation of the efficiency and effectiveness of the COVID-19 response at BH Udugama.

Establishing a COVID-19 coordinating committee early in the outbreak was a critical decision towards the success of the deliberations. All the members of the COVID 19 coordinating committee managed the entire process efficiently and effectively. This committee was nominated at the initial meeting conducted by the consultants, medical officers, and all in-charges of the hospital. This discussion provided a platform for honest, open, in-depth, and creative dialogue with the ultimate aim of improving the wellbeing of the staff and the community. Such coordinating mechanisms have been useful in managing COVID-19 response in hospitals elsewhere in the world. For example, in the department of medicine at Veterans Affairs Connecticut Healthcare Systems used the Incident Command Centers

(ICC) to enhance coordination where the members met daily, while maintaining social distancing, to discuss and formulate policy, review all operational issues, and provide real-time multidisciplinary resolutions. It has been said that the ICC provided the opportunity for robust discussions with an honest and open expression of ideas without the fear of being rejected (10). Another study from the largest academic tertiary level acute care hospital in Singapore (Singapore General Hospital) and a smaller regional hospital (Sengkang General Hospital) show that hierarchy of controls was used as a framework to plan pandemic preparedness and response measures in their operating rooms (15).

One of the critical challenges faced by BH Udugama, in common with many hospitals locally and globally, was the anxiety and the uncertainty associated with the pandemic among the health staff, as they shared the same as the community at large (7). The fear among health staff was further aggravated by the scarcity of human resources, limited supply of personal protective equipment, and limited space at the hospital. However, it was possible to get most of them on board to understand their versatility and value during this unprecedented situation. Further, the high expectations from them, as health staff, by the whole country helped boost their morale. The firm yet caring leadership sensitive to the health staff's needs was able to build much-needed team spirit and group identity as a hospital during this testing

time. The emphasis on establishing team support has been shown to improve the wellbeing of health staff, as evidence by reports from other parts of the world as well (16).

During the COVID-19 pandemic period, Base Hospital Udugama was recognized as a model hospital for other local government hospitals in the district. In addition, it was able to demonstrate the established best practices at the hospital even prior to COVID-19 pandemic. The hospital was meticulously managed with available scarce resources adhering to the standards. Some of the strategies adopted by BH Udugama could be used by other hospitals in Sri Lanka and abroad, especially those in a low-resource setting to prepare, respond and recover from pandemics such as COVID1-19. Overall, the COVID-19 pandemic has brought attention to how easily and fast hospital surge capacity could be overwhelmed, even in sophisticated health systems (13,17,18). In addition, the lack of preparedness of health systems and hospitals across the world to face pandemics has been exposed (19,20). It is essential that the health systems and their managers, including hospital administrators, pay adequate attention to the strengthening of the frontline health institutions towards sudden surge capacity needs.

5. Conclusions

Management of the COVID-19 pandemic was institutionally challenging for BH Udugama. However, it demonstrated its resilience through its robust preparedness, response, and recovery by efficiently and effectively managing the evolving situation through dedicated health staff with the support of strong visionary leadership and intersectional coordination. Early interventions, shared decision making, and teamwork of DH Udugama were determinants for its resilience.

6. Recommendations

The preparedness and response capacity of frontline health institutions should be improved to cater to the needs of the surge capacity of pandemics.

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Figure 2: Waiting Area for Patients



Figure 3 : COVID-19 Sampling Collection Booth Innovated by the Hospital Staff and the Community



Figure 4: In-House Production of Personal Protective Equipment by Hospital Staff and the Community