

# Challenges and Road Map towards Starting a New COVID Hospital

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## ABSTRACT

**Background and Aim:** With advent of the Coronavirus Disease 2019 (covid-19) pandemic, need for a dedicated government hospital was felt. Following directions after a cabinet decision, a dedicated Covid hospital was made functional within a month in Central district of Delhi. This manuscript briefs the journey and challenges experienced during this mission. **Method:** As per decision of the state health ministry, bed allocation was planned along with provision for diagnosis, treatment and prevention of Covid -19. Various trainings were simultaneously conducted, licences were obtained and manpower and material were arranged starting with procurement to service provision and waste management. **Result:** Concerted efforts resulted in initiation of clinical and diagnostic services within one month of initiation of teamwork. Government supported in all the licencing requirements and material management. The hospital became functional during the first wave; and by the start of second wave, 20-bedded fully equipped Intensive Care Unit (ICU) was ready with pressure swing adsorber (PSA) oxygen generator in premises. **Conclusion:** A well-coordinated action in the right direction with administrative support can help in achieving difficult targets. Opening a new hospital amidst lockdown and resource constraints in an emergency situation was a rewarding achievement.

**Keywords:** COVID-19 management, pandemic, support, testing, zoning

## Introduction

When the whole world faced a pandemic situation, the government shouldered the responsibility of providing healthcare and support to their citizens. Challenges were new and so were the opportunities. Thus began the implementation of health strategies and efforts to curtail the spread of this disease. In this article, an experience of opening up a dedicated hospital to serve during a pandemic situation is shared along with challenges and solutions.

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## Subjects and Methods

The hospital is 768 bedded, with seven floors and two levels basement located in Burari, catering to an urban/rural population of approximately 2 lakhs with no access to a bigger government hospital before. Initially, three floors have been made functional with help of Public Works Department (PWD) staff who worked day and night amidst lockdown to finish construction, interiors, electrical, telephone, internet, water, and sewer connections; fire safety, lift, and various other environmental certifications. Meanwhile, the hospital team planned the workflow, logistics, budgets, essential supplies, documents, protocols, manpower recruitment, and management in various departments. The hospital was initiated by Delhi government following approval by the Cabinet in an emergency situation. This study does not involve any patients/subjects.

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## Results

### Challenges faced and resolved

#### Hospital Infrastructure and design

Following Infection control guidelines, the hospital was divided into three zones: green zones which are “no patient” zones, red zones which are “patient zones,” and the intermediate orange zone. These have been prominently labelled and restricted. In the red zone, there is no entry of staff without full Personal Protective Equipment (PPE). This is the area where COVID patients are seen and admitted. Central air conditioning in these areas has been replaced with window air conditioners and installation of powerful exhaust fans to promote negative ventilation. There are dedicated lifts and a ramp in the red zone for easy access of patients and staff. Ground floor red zone consists of Casualty/patient receiving area, sample collection and testing area, and the Intensive care unit. In the orange zone, patient registration and pharmacy are located while the entrance lobby, Oxygen gas plant, and Kitchen & dietary services are in the green zones. The first floor houses the administration department and is completely a green zone. No patients are allowed in this area. COVID-19 wards are located on the third and fourth floors. The wards have been properly designed with adequate distancing between patients’ beds, separate PPE donning & doffing areas, Red & Green zone workstations, and restrooms [Figures 1 and 2].

#### Patient registration and reception

All patients are registered by digital modes. Patients or their attendants are instructed to send patient’s Aadhaar card details to a designated mobile number at the registration counter. Each patient is registered with a unique identification number of the hospital. The registration cards are printed in duplicate and handed over to the nursing officer in flu clinic (red zone) through hospital personnel in intermediate zone. The nursing officer calls the patient, one at a time, records the vitals, and directs the patient to doctor for examination and consultation. The doctor prescribes treatment, advises and orders the test, if required and directs the patient to sampling area. One copy of registration form reaches the sampling area and is kept for entering patient details on ICMR (Indian Council of Medical Research) portal, the other copy is given to the patient with all prescription details. If required, patient’s admission process is started here.

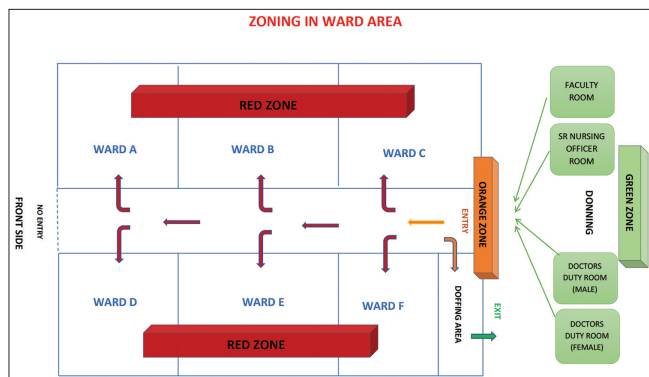


Figure 1: Clear demarcation of different zones on floor map of Ward

#### Patient admission and management

Once the decision for admission is taken, for a patient who is either positive or suspected for COVID-19, the patient is shifted from “COVID Patient Receiving area” in Casualty red zone to Ward red zone. Patient files and test reports are not handled in red zones. Patient’s records are kept in the green zone. Stationary and other registers for red zone is kept separate and information of relevant documents or for communication of patient’s family members, is transferred through digital media like Mobile/computer tablets kept in the red zones. A High Dependency Unit (HDU) has been established in ward where provision of high flow nasal oxygen (HFNO) and Bilevel positive pressure ventilation (BiPap) machines is made to provide High Flow Oxygen to COVID-19 patients with impending respiratory failure. Timely escalation of treatment and shifting patients from Ward to HDU and then to ICU, wherever required, is done as per the COVID-19 Management Protocol of our hospital formulated in accordance with ICMR guidelines.<sup>[1,2]</sup> Regular induction and refresher training of healthcare workers (HCWs) involved in clinical management of patients is done to keep them updated in latest treatment guidelines. Patient details are uploaded daily on various district, state and national level portals through the Nodal Officer. Death cases are handled by a dedicated Medical Officer, a separate hearse van with a dedicated driver and support staff is available for disinfection and transport of bodies to their final site (crematorium or burial ground). Proper protocols for handling of dead bodies of confirmed and suspected COVID cases, disinfection, shifting to in-house mortuary based on ICMR guidelines have been prepared and are being followed.<sup>[3]</sup>

#### Laboratory and radio-diagnostic services

A well-defined laboratory was not present, hence COVID-19 sampling centre was established on the ground floor with plastic curtains, provision of window air conditioners (AC) and ventilation through windows and exhaust. Facility for Severe Acute Respiratory Syndrome- Coronavirus 2 (SARS-CoV2) detection by rapid antigen test (RAT) was started at the centre as per ICMR guidelines.<sup>[4]</sup> For Reverse Transcriptase -Polymerase Chain Reaction (RT-PCR) testing, liaison with the National Centre for Disease Control (NCDC) was

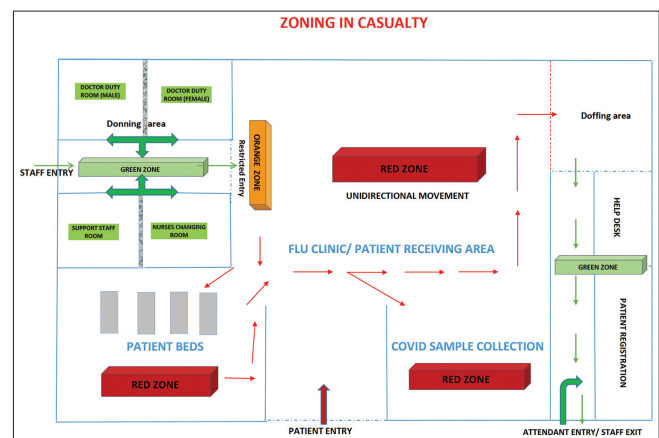


Figure 2: Zoning in Casualty area

established for testing. There is a dedicated team of paramedical and technical staff to conduct sampling, testing and for data record and management, so that there is no crossover of infection. Reports are prepared under supervision of doctor on duty. After sampling for RAT the patient is requested to wait for approximately 30 min. Patients testing positive are directed towards one side and requested to meet the doctor who then advises further management, hospital admission, or home isolation as per the guidelines.<sup>[5]</sup> Negative reports are handed over to the patient with an advice to follow general preventive measures for COVID-19. For symptomatic RAT-negative patients, RT-PCR is requested, report is available after one to two days. The reports are uploaded and shared electronically daily on the ICMR portal, conveyed to IDSP (Integrated Disease Surveillance Project), District monitoring cell through Chief District Medical Officer (CDMO), and State level monitoring committee. Other Laboratory & Radiology Services have been outsourced. Blood samples including routine blood investigations (complete hemogram, liver and kidney function tests, blood sugar levels, etc.); inflammatory markers like C-reactive protein (CRP), D-Dimer, Urine Routine examination, and Digital Chest X-ray are carried for all patients. Additional Investigations like interleukin-6 levels, serum ferritin, lactate dehydrogenase levels, glycosylated hemoglobin (HBA<sub>1C</sub>), High Resolution Computed tomography (HRCT) Chest are carried in selected patients. A dedicated room for Digital Chest X-ray facility is provided in red zone of the ward. To ensure timely availability of reports, a printer and film processor is installed in green zone.

#### Support to patient and their relatives

- “**Help Desks**” have been created in Casualty and Ward green zone areas to answer queries of patient’s attendants/relatives and provide/hand over essential personal items supplied by family members for patients.
- ‘**Rogi Sahyog Samiti**’ (Patient Help Group) has been created in local language (hindi) on WhatsApp for all admitted patients, their relatives, and doctors & nursing staff in COVID ward. It also includes Medical Director and Senior doctors and nursing officers as members so that the patient’s needs, and complaints are immediately addressed and resolved timely.
- “**Daily Patient’s Health Bulletin**” of all patients is shared on this platform to display the current medical status of patients which helps to resolve all patient related queries. A **dedicated team** of doctors, nurses, and support staff is available in the red zones round the clock.
- **Closed circuit (CCTV)** cameras have been installed in all cubicles and corridors for monitoring and security.
- Supply of all essential medicines, Surgical consumables, non-Consumables, equipment, pertaining to COVID-19 are adequately ensured.

#### Support to the healthcare workers in hospital

- a. Logistic support in terms of availability of infection control supplies including hand sanitizers, soaps, PPE, stationery, is provided and accommodation is offered to all categories of health care staff.
- b. HCWs posted in red zones have a duty shift of 6 h. To minimize infection and fatigue in HCWs, there is a provision

of quarantine after 2 weeks duty period to Doctors, Nursing, and paramedical staff. COVID testing is encouraged after completion of duty to timely diagnose infected staff. All HCWs are screened in the wards before start of each shift to detect features of COVID infection in accordance with NCDC guidelines.<sup>[6]</sup>

- In case of suspected COVID exposure of HCW, risk exposure is assessed by the Hospital Infection Control Committee on the basis of details filled by him/her online on a Google sheet.<sup>[7]</sup> In case of high-risk exposure, HCW is quarantined for 14 days and if their COVID test report is positive, HCWs are advised Home Isolation for 17 days with regular monitoring.<sup>[8]</sup>
- To encourage and motivate hospital staff working under stressful conditions during this pandemic, an “Employee Appreciation Day” is observed on the 25<sup>th</sup> of every month in which frontline HCWs from all categories of staff, including doctors, nursing staff, paramedical, administration and support staff are awarded “Certificate of Appreciation” based on nominations received through respective in charges and shortlisted based on a five-point evaluation system decided by the committee.

#### Hospital infection prevention and control (HIC) and training

Formulation of HIC and BMWM committee was the first step. Mandatory induction training program for all staff at the time of joining this institute and regular refresher trainings were conducted on hand hygiene,<sup>[9]</sup> biomedical waste management,<sup>[10]</sup> solid waste management,<sup>[11]</sup> cleaning and disinfection, Spill management, needle stick injury management, and general policies regarding prevention from coronavirus infection.<sup>[12]</sup> Common policies and protocols were explained, compiled in the form of manual; and as frequent reminders, public messages and other IEC (Information education and communication) material was printed and displayed at strategic locations across the hospital. Challenge came more from outsourced employees like housekeeping staff, nursing orderly, security guards who had never worked in a health care setup before. They were trained daily in small batches. Practical demonstration of mask wearing personal protective equipment (PPE) donning & doffing and hand hygiene was done.

#### Biomedical waste management (BMWM)

Hospital management is incomplete till its waste is properly managed. For this purpose, biomedical waste management (BMWM) and solid waste management (SWM) committees were formed, and duties were allocated. Demand for items like color coded bins, trolleys, bags was placed as per guidelines. Central waste storage site was identified and established with different rooms demarcated for different categories of biomedical waste and general solid waste. For liquid waste management, an effluent treatment plant and Sewage treatment plant were made functional and effluents from these were tested by Delhi state pollution control board (DPCC) laboratory. Emergency 6-month authorization was sought from DPCC for management of COVID-19 waste. Simultaneously,

application was filed online requesting for authorization for generation and storage of all kinds of biomedical waste. DPCC designated common biomedical waste treatment and management facility (CBWMTF) was contacted and requested to lift biomedical waste on daily basis. For solid waste management application was submitted to MCD office and process of transport of this waste was also initiated. Authorization credentials for use of app by Central Pollution Control Board (CPCB) was requested for recording COVID-19 waste daily.<sup>[13]</sup> Daily Record of biomedical waste sent to CBWMTF is maintained in this app and in registers in a proper format. Daily checklists pertaining to HIC and BMWM are filled online on a Google sheet designed for this in the computer tablet, during visit of infection control officer and nurses in red zones and based on CCTV recordings so that it is made paperless. These findings are compiled on a monthly basis and shared with the committee members during meetings. Monthly and quarterly reports are regularly being sent to Delhi health services (DHS) as per guidelines.

### Quality management system (QMS)

Vision, Mission, and hospital motto have been defined. Logo of the hospital has been designed and approved. Hospital stationery including printed forms and registers have been formatted and procured. Standard operating procedures have been prepared and committees have been formulated based on National Quality Assurance Standards (NQAS),<sup>[14]</sup> National Accreditation Board for hospitals and Healthcare Providers (NABH),<sup>[15]</sup> and Kayakalp guidelines.<sup>[16]</sup>

- **COMMITTEES:** Hospital infection prevention and control committee, Biomedical waste management (BMWM) committee, Solid waste management (SWM) committee, PWD Committee, Quality assurance committee, Purchase committee, Stores approval committee, Sexual harassment at workplace committee, Clinical and Death Audit Committee, Committee for Appreciation of HCWs.
- **AUDITS:**
- Clinical Audit: Regular audit of clinical cases is done to incorporate newer advances in treatment of COVID patients as recommended by ICMR and other major institutions and protocol for management of patients is regularly updated.
- Death audit is done within 48 h of occurrence of the event and reporting to state authorities is done within 24 h of death. An institutional death audit committee is constituted for this purpose which regularly meets for audit of death cases. The Death Audit Committee evaluates all COVID-19 deaths occurring in the hospital in accordance with pre-designed format, with emphasis on treatment given, sample positivity status, status of inflammatory markers, and comorbidities.
- Monthly audits of biomedical waste management, infection prevention and control and hand hygiene are done.

Various training programs on hospital infection prevention and control, biomedical waste management, clinical management of COVID patients, management of sick patients, basic life support, ventilatory support and others are regular and ongoing.

## Discussion

After successful completion of 4 months of Outpatient, Inpatient, Sample Collection and Testing center, at Burari Hospital an Intensive Care Unit dedicated for Severe COVID-19 patients with 20 Ventilators along with provision of HFNO & non-invasive ventilation (NIV) has been established in accordance with Infection Control Guidelines & proper demarcation of Red/Green zones and Donning - Doffing areas. Recently, the hospital has started COVID-19 vaccination services also. From one hospital administrator, the Medical Director who initiated the job to an initial team of people, in four months, it grew to a family of around 400 hospital officers and staff. Though this hospital was inaugurated during the first wave to cater to COVID-19 patients, it has been able to handle patients during the second wave in Delhi too. Efforts are continuing and strengthening of oxygen delivery is being done through installation of liquid medical oxygen (LMO) tank in the premises, provision of oxygen port at every bed in the hospital and upgradation of the medical gas pipeline system (MGPS). It has been upgraded to total 700 beds dedicated for COVID-19 management and 195 ICU beds. Overall, starting a COVID health facility in a new hospital building was a challenging but fruitful experience.

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### Conflicts of interest

There are no conflicts of interest.

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