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3

#### 4 **Abstract**

5 The Coronavirus disease (COVID-19) pandemic has overwhelmed healthcare services  
6 worldwide. Being prepared for a crisis of such intensity requires intense planning, teamwork,  
7 and efficient leadership. This pandemic has made us realize how vulnerable we are. The goal of  
8 any preparedness plan of an organization is to provide care to patients while ensuring the  
9 safety of their healthcare staff. With this article, we aim to provide insights into the various  
10 measures a hospital/organization needs to take to tackle this crisis and be ready to handle a  
11 surge of patients should it occur. We have also tried to discuss various hurdles the  
12 administrative team faced while managing the various aspects of the preparedness plan and  
13 potential solutions to deal with the challenges faced.

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15 *Index terms—*

#### 16 **1 Introduction**

17 r. Balabhai Nanavati Hospital, blessed by Mahatma Gandhi, inaugurated by India's first Prime Minister,  
18 Jawaharlal Nehru in 1950 was reintroduced as Nanavati Super Specialty Hospital (NSSH).

19 Nanavati Super Specialty Hospital has been at the forefront of healthcare for the past 70 years.

20 As the COVID 19 pandemic struck our community, NSSH proactively took the initiative of systematically  
21 screening as well as triaging and getting ready to serve the community.

22 At NSSH, we made stringent protocols to segregate suspected cases, collect samples for testing and, if required,  
23 admit them in dedicated isolation units. The COVID-19 isolation wards & Isolation Intensive Care Unit was set  
24 up in a separate building to ensure the safety of other patients.

25 In the current dynamic scenario, the number of positive COVID-19 cases is on the rise, and guidelines need  
26 to be updated time and again. As a responsible medical facility, NSSH was gearing up to be prepared to provide  
27 continuous medical support in keeping with National and International standards. In its thirst for continual  
28 improvements, NSSH strived to serve the society at large and be in the frontline as CORONA WARRIORS.

29 We would like to discuss various steps taken by the administration in dealing with the COVID-19 crisis at a  
30 tertiary care hospital, along with the hurdles faced & the measures taken. We aim to share our experience &  
31 practice, which could be insightful to other hospitals, who would eventually have to face these challenges if an  
32 unprecedented surge does occur.

#### 33 **2 Few Facts**

#### 34 **3 Role of Medical Administration**

35 Considering the severity of the disease, Medical Administration geared up, and along with Chief Operating Officer,  
36 Executive Director, formed a multidisciplinary Task Force named Apex Committee. The committee prepared  
37 detailed process flows, conducted training sessions & initiated the process. Following were the objectives to start  
38 with: ? To devise standard Safety guidelines to be followed by all staff and to ensure that these guidelines were  
39 strictly adhered to by everyone with the help of regular training and audits. The final aim is to safeguard the  
40 health of the entire healthcare personnel and to prevent transmission to the vulnerable population.

41 ? To form a Safety Team: comprising of representatives of Quality, Clinicians, Nursing staff, and Human  
42 resource department. The first step towards getting our hospital prepared was to establish an APEX committee  
43 for COVID care. The key members of this committee were:

44 Hospital Director and Chief Operating Officer: Their leadership and support ensured that all departments  
45 worked collectively.

## 6 ACTIVITIES IN LOCKDOWN PERIOD

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46 The Director of medical services, Medical superintendent, Deputy Medical Superintendent and General  
47 manager, Operations: They organised and led the daily meetings and finalized decisions based on inputs from the  
48 multidisciplinary team. Their excellent leadership and decision-making were pivotal to the smooth functioning  
49 during the whole preparedness process.

50 Director of Critical Care, and Department Heads of Medicine, Emergency Medicine, and Surgery: These  
51 were the departments dealing with the patients directly. Coordination between various department heads,  
52 administrators, and their staff was essential for ensuring success of the planning process.

53 Chief Nursing Officer and Accreditation Coordinator, played a vital role in dealing with nursing issues for  
54 COVID patients, conducted regular training for staff for screening, Triage, and management of COVID patients.

55 Quality Manager and Hospital Laboratory and Infection Control Committee: who studied the ever changing  
56 guidelines from WHO, Ministry of health and family welfare, CDC, and implemented them effectively. Ensuring  
57 the safety of staff was very crucial to this plan. The most crucial and essential step to control the spread of the  
58 disease was to segregate COVID suspect patients from routine patients. We used case definitions and guidelines  
59 issued by the Ministry of health and family welfare (3).

### 60 4 COVID-19 Case Definitions (3) Suspect Case:

61 A patient with acute respiratory illness (fever and at least one sign/ symptom of respiratory disease (e.g.,  
62 cough, shortness of breath) AND a history of travel to or residence of a country/area or territory reporting local  
63 transmission (See NCDC website for an updated list) of COVID-19 disease during the 14 days prior to symptom  
64 onset; OR A patient / Health care worker with any acute respiratory illness AND having been in contact with  
65 a confirmed COVID-19 case in the last 14 days prior to onset of symptoms; OR A patient with severe acute  
66 respiratory infection (fever and at least one sign/symptom of respiratory disease (e.g., cough, shortness of breath)  
67 AND requiring hospitalization AND with no other a etiology that fully explains the clinical presentation.

### 68 5 ORA case for whom testing for COVID-19 is inconclusive 69 Laboratory Confirmed case:

70 A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

71 Immediate measures were taken to isolate the patientas soon as a case was identified, and the concerned  
72 authorities were immediately notified.

73 Screening Protocols were standardized, based on guidelines from respective authorities with timely amend-  
74 ments. Screening guidelines were updated with changes made accordingly in the screening checklist provided to  
75 all the personnel on screening duty.

76 Every Single Personnel entering the hospital (patient, visitor if any, healthcare staff, vendoretc.) was screened.

77 The temperature was checked immediately after entry; then personnel was sent to the screening booth for  
78 history using a screening checklist, to identify people with history of travel, contact or symptoms of acute  
79 respiratory illness(ARI) like fever, cold, cough, and breathlessness.

80 Multiple screening desks were available to ensure the fast transit of patients. The screening was done by trained  
81 healthcare personnel in recommended PPE (Personal Protective Equipment) Screening checklist (questions to  
82 ask and actions to take)-to rapidly identify and isolate suspect COVID-19 cases was provided to them along with  
83 extensive training.

84 Screening was done following social distancing guidelines. Patients were supposed to stand on stickers marked  
85 at least 6 feet apart.

86 Additional Doctors were stationed at the screening booth to further strengthen the process by identifying  
87 patients not disclosing all relevant history.

88 Anybody with a positive history was sent to the triage area (Fever/Flu clinic) where a detailed assessment  
89 was done to identify risk factors and severity of the disease. Patients were asked to fill a Self-Declaration form;  
90 wherein a checklist is available. Swabs were further collected for testingCOVID-19 as per the clinical condition  
91 &advice.

92 The patients were segregated into 1) COVID suspects -symptomatic stable or unstable (critical). 2) COVID  
93 Positive -symptomatic stable or unstable (critical). The symptomatic patients were admitted to COVID wards,  
94 and the critical patients with serious disease were admitted to COVID Intensive care units.

95 After the test results were available, patients were shifted to normal non-COVID wards if the test results were  
96 negative and screening HRCT Chest did not reveal COVID like findings. Isolation units with secluded beds had  
97 been created for COVID suspect and positive patients in a separate building.

### 98 6 Activities in Lockdown Period

99 On the evening of March 24th, the government declared a 21-day lockdown from midnight onwards to control  
100 the spread of COVID -19. (4)

101 The lockdown was further extended in phases, and India was under a nationwide lockdown till 31st May in  
102 the city. (5)The Ministry of Home Affairs released new guidelines called 'Unlock 1.0' that allow the opening of  
103 malls, restaurants, and religious places in all areas except the containment zones from June 8 th , 2020. (6)

104 The biggest challenge & in fact the need was to restrict the footfall to the Hospital, which could help social  
105 distancing & decrease the chances of infectivity.

106 All outpatient services were closed in an attempt to reduce footfall and prevent transmission. All elective  
107 procedures/investigations had been canceled/rescheduled. Only emergency cases were being managed like stroke,  
108 obstetric emergencies, myocardial infarction, neurosurgery cases, pediatric emergencies, etc. Patients on hemo  
109 dialysis and those requiring chemotherapy were offered care using proper precautions to ensure their safety as  
110 these patients are at risk due to immune suppressed status. Once patients were found to have risk factors, it was  
111 of utmost importance to segregate them from the routine patients and admit them in dedicated isolation wards.  
112 This required strategic planning and the management faced a dual responsibility here, to safeguard the health of  
113 already admitted patients and patients coming in for services like chemotherapy and hemo dialysis while making  
114 sure proper care was provided to the ones suffering from this dreadful disease. to ensure these, a separate building  
115 (Annex) within the hospital premises, which had an exclusive access, was designated as the isolation building. It  
116 had special COVID wards and Intensive care units.

## 117 **7 Testing for COVID**

## 118 **8 Continue**

119 The designated wards were made using guidelines which were followed strictly.

120 ? The building had a separate entry and exit. ? Good ventilation; these areas were not a part of the central  
121 air-conditioning. ? A minimum distance of 1 meter maintained between adjacent beds in the designated Ward/  
122 ICU. ? Lines of demarcation for restricted entry in the ward were put in place. ? The Donning and Doffing areas  
123 for PPE were separate. A shower facility was available.

124 ? The Dirty Utility Area was segregated and dedicated to the Ward/ICU and not shared with any other area.  
125 ? Portable X-ray was placed inside the Ward and dedicated for the use of COVID 19 patients. ? The isolation  
126 wards/ICUs had a separate toilet with proper cleaning and supplies. ? Visitors were strictly not allowed in the  
127 isolation facility.

128 All healthcare workers working in these wards had to follow stringent safety protocols and exhaustive  
129 management guidelines. Doctors, Nurses, Housekeeping Staff, and administrators posted to isolation facility  
130 were dedicated and not allowed to work in other patient-care areas ? Healthcare workers in this ward are posted  
131 for 14 days with weekly offs and 6 hours duties. Swabs were sent between days 5 and 7 after the last working  
132 day. Doctors on duty were provided accommodation in a good facility nearby; expenses of which were borne  
133 by the management. encouragement to all the Consultants, Clinical Associates, Residents, and nursing staff. ?  
134 Teams were formed like a safety team to ensure proper use of PPES and safety protocols. General audits were  
135 held to assess the effectiveness of training sessions. ? The housekeeping staff was provided regular training and  
136 guidance as these are the ones who directly come in contact with biomedical waste. ? All healthcare workers  
137 were provided prophylaxis (hydroxychloroquine). NSSH was probably the first hospital to initiate this along with  
138 MAX Hospitals. ? Management protocols were designed for the treatment of COVID-19 patients, which were  
139 updated timely. ? All the patients were strictly monitored.

140 Routes for patient transfers: COVID-19 patients requiring investigations like CT scan or Magnetic Resonance  
141 Imaging (MRI) were transferred through a separate Brown corridor, which was created during every patient  
142 transfer. This required coordination from the entire staff, including administrative managers, doctors,  
143 housekeeping, cleaning team, etc. Safety precautions were taken, and sanitization was done immediately after  
144 the transfer of a suspected or positive patient.

145 Disinfection and Sanitization-strict protocols were laid down for cleaning and disinfection.

## 146 **9 Training Training Training**

147 Training was probably the most difficult and essential aspect of a successful preparedness plan. Detailed  
148 presentation with videos, graphics, etc made in English & Marathi for better understanding were made.

## 149 **10 Training sessions**

150 Figure 14 Figure 15 Figure 16

## 151 **11 VI. Covid 19 -Staff Health & Safety Team**

152 Caring for suspected/confirmed COVID 19 patients in the hospital posed a new set of challenges. Staff at the  
153 frontline needed to learn new skills, follow new patient care guidelines, deal with a never before encountered  
154 crisis, and, most importantly, protect themselves, their patients, and their co-workers from the spread of  
155 this highly virulent infection. No amount of infection prevention precautions was going to be enough; the  
156 minutest gap could lead to catastrophic consequences to staff and patients. The safety of healthcare workers,  
157 therefore, is of paramount importance. They are the organization's most valuable resource. NSSH is taking  
158 all efforts to ensure the best standards of medical care and staff safety are put in place and to ensure the health and well-  
159 being of the staff as they navigate this challenging time. To check the effectiveness, learn about opportunities for

160 improvements, and put in place corrective measures on a daily basis, we constituted "Staff Health and  
161 Staff Safety Team."

162 The team comprised of the following:

### 163 12 Process Flow of Imaging

164 Only emergency and semi emergency investigations were done. All elective procedures were canceled.

### 165 13 Following investigations were done:

166 ? MRI-Indications like stroke, seizures, paediatric emergencies, etc. ? Ultrasound-obstetric scans, severe  
167 abdominal pain/ureteric colic, appendicitis, obstruction, surgical indications like appendicitis, cholecystitis, and  
168 pediatric emergencies. ? CT scan-Stroke, trauma, severe breathlessness to rule out pulmonary thromboembolism

### 169 14 b) Prophylaxis

170 Prophylactic Hydroxychloroquine was given to all healthcare personnel, frontline as well as others Dose: Tablet  
171 Hydroxychloroquine 400 mg BD, followed by 400 mg once a week.

172 Management of accidental exposure in healthcare personnel-safety of the staff was our prime concern, but  
173 accidental exposures do occur, and their management had to be done swiftly. This included contact listing as  
174 well with the help of CCTV footage and questioning. Examination without adequate PPE.

175 ? Anyone in proximity (within 3 ft.) of the confirmed case without precautions. Management of such High-risk  
176 contacts: Stop all health care interaction with patients for a period of 14 days after the last day of exposure.  
177 SWAB sent on day 5

### 178 15 Quarantine for 14 days d) Low risk-HCW wearing proper 179 PPE(3)

180 Management: Self-monitor temperature and respiratory symptoms daily for 14 days after the last day of exposure  
181 to a COVID-19 patient and inform if symptoms occurred.

182 Reinforce contact and droplet precautions when caring for all patients. Guidelines provided by Mo HFW were  
183 utilized. (3) X.

### 184 16 Counseling and Psychological Support

185 Counseling staff was a major challenge as it was of utmost importance to maintain the morale of all healthcare staff  
186 working for COVID-19 patients. Patient counselling was another issue tackled by the aid of video/tele-services  
187 as patients in isolation were under mental and psychological stress away from families.

188 Counseling sessions were arranged for staff regularly.

### 189 17 Methods used:

190 ? Tablets were provided to patients. Counseling was done using phone, WhatsApp, and video calls. ? Family  
191 Briefing and Counseling was arranged using electronic media like TAB video counselling. ? The consultant  
192 doctor in charge of the patient would engage with the family /attendant once a day and as and when required  
193 with documentation in family briefing form done once every day. The entire healthcare force has been under  
194 tremendous pressure during these times, not just physically but emotionally as well. Social distancing and  
195 quarantine measures have had an impact on psychology. Keeping the staff motivated throughout the whole  
196 process was very crucial. The management was trying to keep the morale high by arranging regular counseling  
197 sessions for all staff. Entertainment activities like singing sessions were organized for staff on weekends to lift their  
198 spirit. Video calls and other virtual methods of contact were advised between healthcare staff and supervisors  
199 for any guidance needed.

200 Change is inevitable but at the same time, adapting to change is difficult. Everything in our workplace has  
201 currently changed, but what keeps employees motivated and what employers and leaders can do remains the  
202 same, that is, to appreciate, encourage, and support. The administration strongly believed in this.

### 203 18 b) Digital health-Telemedicine

204 Digital health is turning out to be a promising solution currently. (8) Telemedicine has proved to be a key enabler  
205 during these difficult times.

206 Teleconsultation services were provided to patients with mild symptoms not related to COVID-19 and who did  
207 not need a hospital visit, using guidelines provided by the Ministry of health and family welfare and Maharashtra  
208 Medical Council (9, 10). During this pandemic, the utilization of tele health services certainly helped to slow  
209 transmission by reducing direct contact of patients with healthcare facilities, also enabling patients not suffering  
210 from COVID-19 to continue to receive care. This was particularly important for older adults, immune com  
211 promised patients and diabetics who were at the most risk during this pandemic.

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212 For Radiology services, home workstations with remote access were provided to radiologists wherever feasible.  
213 Teleradiology made it possible for radiologists to view and report scans from their homes, thus protecting  
214 them from exposure while providing the Tele-technology also made it possible to conduct training sessions,  
215 administrative meetings, and educational activities effectively. Multiple webinars had been arranged by various  
216 academic groups throughout the country to ensure continuous learning was not hampered.

## 217 **19 c) Challenges faced by the Medical Administration**

218 COVID-19 pandemic brought with it many challenges having a deep impact on social life and the economy.  
219 NSSH took the initiative of screening and triaging all hospital visitors. The administration and management  
220 team of the hospital worked relentlessly to prepare an efficient strategy and make SOPS for proper management  
221 of hospital operations.

222 The economic impact faced by the hospital due to reduced footfall, closed OPDs, loss of international patients,  
223 and cancellation of elective procedures was going to be a tough one, but the primary aim was to safeguard the  
224 health and save lives. To ensure COVID preparedness, hospital expenditures also increased as funds had to be  
225 arranged for safety equipment like PPEs, cleaning and disinfection supplies, ambulances for patients. The fixed  
226 costs of running a hospital are immense. To manage these, while managing to pay staff salaries and ongoing  
227 operations were and are going to be tough tasks.

228 The number of positive COVID 19 cases are rising daily. The guidelines and strategies for testing, management,  
229 and screening provided by various authorities like ICMR, WHO, MOHFW, MCGM had to be thoroughly read  
230 and understood and appropriately updated time and again. As a responsible medical facility, NSSH was prepared  
231 to provide continuous medical support in keeping with National and International standards.

232 A nationwide lockdown was announced by the government to reduce spread of the disease. However, this also  
233 had an impact on healthcare facilities.

234 ? Constant supply of Protective equipment's: PPEs, disinfection, and sanitization, arranging supplies for safety  
235 also was a concern as the stocks were not enough. This pandemic was an unprecedented one and preparation  
236 for this was not possible due to the already existing shortage of supplies in the market. Finding distributors and  
237 liaisoning was a major concern. But we could overcome this with the support of Authorities. ? Staff movement  
238 and transportation -shut down of local transport caused difficulties to healthcare personnel to reach the hospital  
239 for duty. The hospital management arranged bus transportation for the staff& sought the help of Authorities for  
240 staff' transport.

## 241 **20 Documentation**

242 ? The biggest challenge was to ensure documentation. In normal circumstances, the relatives were available for  
243 signatures after communication & counseling. In this COVID crisis, as the relatives were usually quarantined, it  
244 was very difficult for the doctors to maintain records .Various electronic media had to be used.

245 ? Doctors in PPE faced a lot of practical difficulties to do the paperwork. Medical Administrative staff  
246 could do audits to check the documentation but in case of the COVID scenario , wherein papers could not be  
247 transferred to Non-COVID areas , it was difficult to do so. ? Psychological impact -Doctors, Staff Nurses,  
248 support staff administrators are human too! They have been called CORONA warriors, but this war has had a  
249 toll on all. Time away from families due to excessive work as also quarantine measures had surely affected all.  
250 The Management started communication on a daily basis and even were approachable in emergencies. There was  
251 constant dialogue, interaction with personnel & in some cases had one to one conversation with their families  
252 too.

253 Extensive research and study with long working hours away from family -strategy planning Prepare a COVID  
254 preparedness plan to manage COVID patients while ensuring safety and providing care for routine patients.

## 255 **21 Challenges faced by the Medical administration**

256 Deal with economic impact of the pandemic while maintaining staff morale and their financial security along  
257 with operations and preparedness expenditures Manage shortage of Supplies like PPE and liaisoning with  
258 distributors/manufacturers Documentation In normal circumstances, the relatives were available for signatures  
259 after communication & counselling . In COVID crisis, as the relatives were usually quarantined , it was very  
260 difficult for the Doctors to maintain records . Electronic media had to be used . Practical difficulties faced by  
261 doctors in PPE while doing paperwork. Documentation audits by Medical Admin staff were difficult as papers  
262 could not be transferred to Non-COVID areas.

263 XI.

## 264 **22 Conclusion**

265 Tackling this pandemic has caused stress on hospitals everywhere, financial, psychological, and social. But there  
266 will be ways to weather this storm, and we must not lose hope. Doctors are the soldiers; the world will remember  
267 once this war is over. Our current priorities for COVID-19 preparedness should be to focus on early detection,  
268 limiting exposure, safety precautions, training, and maintenance of operations and staffing. Patience, calm minds,  
269 new administrative ideas and strategies, individual and cumulative discipline, a sense of solidarity, and a shared

## 22 CONCLUSION

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sense of purpose are all that we need currently to overcome these unprecedented and challenging circumstances.



Figure 1: ?

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Figure 2: ?

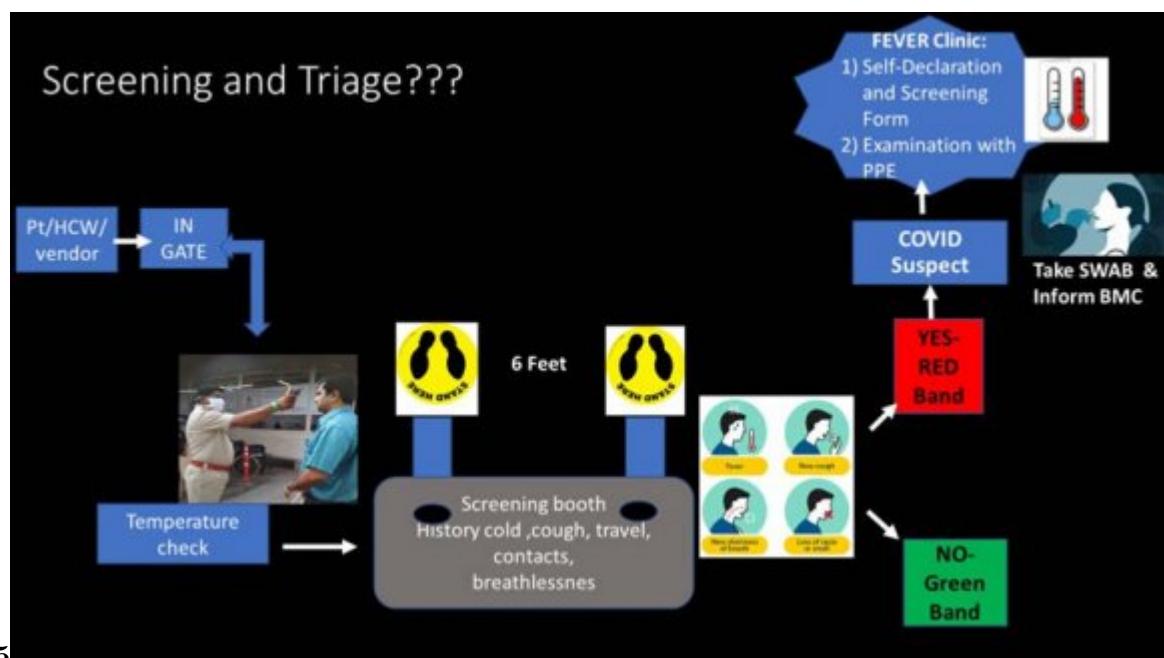
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Figure 3:



Figure 4:



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Figure 5: Figure 4 :Figure 5 :



Figure 6: Figure

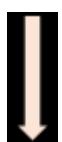


Figure 7:



Figure 8: ?



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Figure 9: Figure 9 :



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Figure 10: Figure 11 :



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Figure 11: Figure 12 :



Figure 12:



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Figure 13: Figure 20 :



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Figure 14: Figure 24 :



Figure 15:

**25**



Figure 16: Figure 25 :



Figure 17:



Figure 18:



Figure 19:

? To strive towards Staff motivation and encouragement.

*[Note: ? To arrange regular meetings with supervisors and owners to discuss progress, daily activities, and new ideas to tackle this crisis.? To be ever ready & promptly solve all crisis situations. ? To have PR, Media preparedness plan.]*

Figure 20:

? To develop Standardized, written protocols for identifying, Segregating, Monitoring and, reporting of COVID-19 patients.

Figure 21: ?

- ? All waste collected in different colored bags was finally.
- ? Placed in a double-layered yellow bag and sealed after spraying 1% sodium hypochlorite over the inner waste bags.
- ? A dedicated collection bin labelled as COVID-19 was used to store COVID-19 waste and keep separately in temporary storage room before handing over to authorized staff.
- ? Separate record of waste generated from COVID-19 isolation wards was maintained.
- ? The surface of containers/bins/trolleys used for storage of COVID-19 waste were disinfected with 1% sodium hypochlorite solution daily.

VII.

- Acknowledge tough situations and recognize accomplishments, even small ones.
- ? Provide help with basic needs, such as transportation.
- ? Monitor each other's workload and encourage each other to take breaks.
- ? Communicate your buddy's requirements and their limitations to the managers -try to make your buddy feel "safe" to speak up.
- ? The Staff Health & Safety Team conducted daily audits, immediately started doing closures of the Audit findings ; training was continued .

a) Infectious waste management

Biomedical waste management is probably the most challenging aspect of this entire process. Waste management was done following guidelines as per BMWM rules, 2016, Ministry of Health and Family Welfare guidelines (Mo HFW)

*[Note: ? Separate color-coded bins/bags/containers were placed in isolation wards and proper segregation of waste was maintained as per BMWM Rules, 2016. ? As precaution double-layered bags (using two bags) were used for collection of waste.]*

Figure 22:

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28 Precautions Screening history Full PPE Cleaning and disinfection with settling time in between cases at  
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Figure 23: A



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**278** safety team, nursing staff, and infection control team as also each member of the organization who helped in this  
**279** hospital-wide response to COVID-19.

**280** [Ting et al. ()] 'Digital technology and COVID-19'. D S W Ting , L Carin , V Dzau . 10.1038/s41591-020-0824-5.  
**281** <https://doi.org/10.1038/s41591-020-0824-5> *Nat Med* 2020. 26 p. .