

Review Article

A Primer on Pandemic Preparedness for Health Care Facilities Drawn from the SARS-CoV2 Pandemic

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In late 2019, an epidemic of Novel Corona Virus infection later named SARS-CoV2 hit China followed by rapid spread of infections across the World. Notwithstanding Government mandated measures like lockdown, rigorous testing, universal masking and COVID-19 screening camps, it is important for hospitals to be prepared to face the pandemic. A proper triaging facility with appropriate infection control precautionary measures, adequate supply of Personal Protective Equipment (PPE), rational usage of disinfectants and PPE, protection of health care workers and prevention of cross transmission of infection in a health care setting needs to be implemented through appropriate guidance and experts. In this review article, we share our experience and key areas that need to be addressed by any institution during a pandemic situation.

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In December, 2019, an increasing number of pneumonia cases of unknown aetiology were identified in Wuhan, China¹. By early January it was an epidemic in China and thereafter due to rapid spread of the virus, was declared a pandemic by WHO in March, 2020. Risk mitigation and preparedness in the early phase of an outbreak is of utmost importance during a pandemic. Low- and Middle-income countries (LMICs) are uniquely susceptible to the direct and indirect effects of pandemics due to a combination of unfortunate characteristics: increase in the travel due to globalization²; densely populated urban areas with large migrant populations³, strained health facilities and bed status⁴; low Government expenditure on Public health⁵; greater reliance on the private health care sector to cater to healthcare needs, and a high proportion living below the poverty line that limit awareness of, and access to, health care⁶.

Even though the attention of the world during the SARS-COV2 pandemic has been monopolized by issues of testing and lack of kits⁷, experimental drug

Editor's Comment :

- Health care institutions especially in low and middle income countries are susceptible to direct and indirect effects of a pandemic situation.
- The key principle to combat a pandemic crisis in an institution is to make hospital infection control committee as nodal point with representatives from each department by engaging all the stakeholders of the institution.
- Based on the lessons learnt from the COVID-19 pandemic in 2020, we understand that a coordinated, multi-disciplinary system is helpful to manage the crisis in an institution.

therapies⁸, and the race to develop a vaccine⁹, the issues on the ground for LMICs are far more prosaic and need tailored strategies to build up the health care system. Every nation has adopted draconian measures including complete lockdown, travel restrictions, stay-at-home, and social distancing. Many of these strategies to limit community spread cannot be implemented in a hospital. Instead, every hospital needs a preparedness policy based on their infrastructure, number of patients, speciality units in the hospital, hospital bed capacity, intensive care unit capacity, patient to health care worker ratio and annual budget⁴. In the pandemic phase, despite information overload and uncertain scientific evidence, health care providers need an effective infection prevention policy to work at the frontline. It is the primary role of the Hospital Infection Control (HIC) team to act as the core defence team for health care providers, patients and employees to prevent COVID-19 infection. In this article, we list key areas institutions need to address

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when responding to a pandemic, based on our experience.

Team Building :

The key principle of team formation is to have broad representation from administrative, medical, nursing, and paramedical cadre ensuring diversity of gender, skill sets and experience. Each team should have a Designated Team Leader, Pager Number and Institutional Email Address which should be prominently displayed throughout the institution. Teams should have rolling meetings at a designated time and frequency either in person or virtually, during which relevant protocols are formulated, critically appraised, and updated based on emerging evidence, institutional resources, and feedback from end users regarding loopholes and barriers to implementation.

The nodal point for any pandemic preparedness programme is the Hospital Infection Control Committee (HICC). Its mandate is to monitor local and international infection trends to recognize emerging epidemics, gather all relevant information regarding the mode of transmission, reproduction number (R_0) and clinical presentation, and make a realistic assessment of the preparedness of the country, state, district and institution to counter the threat. Consequent to this assessment, the HICC must immediately set up an Infection Prevention and Control (IPC) Team.

IPC Team : This team, with representatives from the HICC, Infectious Disease, Microbiology/Virology, Nursing, Paramedical, Administrative, Clinical and Triage teams, should be led by a senior administrator who has prior experience with handling outbreaks/epidemics, and has the following key roles.

- Formulating and updating protocols and guidance for infection prevention and control taking into account existing local, national and international guidelines. Where, in the judgement of the IPC, these guidelines are lacking, or do not fully address all aspects of the problem, the IPC may need to incorporate best practices, based on prior experience with similar epidemics in the past.

- Formulating protocols to prevent infection in operation theatres, in-patient, out-patient, diagnostic, therapeutic and laboratory services and working with independent departments to rationalize their protocols in line with Institutional Guidelines

- Coordinating with the PPE team to formulate the institutional PPE use and re-use policy

- Updating protocols regularly based on WHO and national situation reports or directives (eg, the list of high epidemiological risk countries or states)

- Making all protocols available and accessible on the institutional intranet.

- Coordinating with all pandemic teams

- Tabulating daily statistics for reporting to the local health authority

- Organizing contact tracing where required.

- Issuing travel advisories to staff, working with the Staff and Student Health Service to institute quarantine for staff returning from high risk areas, and monitoring them for symptoms

Administrative Team : The administrative team should comprise personnel with leadership roles in medical, nursing, allied health and support services along with a representative from the HICC. This is the apex team in that it is responsible for ratifying all policies and protocols and its leaders must liaise directly with local health or administrative authorities to ensure smooth functioning of the institution, while also communicating with the staff and student body to enjoin their cooperation and allay fears. The team should meet daily to review the following key areas: (a) Case statistics, stratified by gender, age group, co-morbidities, geographical area and presumed mode of infection (b) Updates from international, national or local health or administrative authorities that directly impact patient care and the running of the institution (c) Status of key resources required for preventive and curative management – Manpower and infrastructure (d) Infection control (e) Employee and student safety and wellbeing (f) Protocol amendments required in light of the above.

Triage Team : Primarily comprising members from Emergency Medicine, General Medicine, Paediatrics, Surgery, Obstetrics, Nursing, HICC, Hospital Management, Medical Records, Outpatient and Security Services, this team develops strategies for crowd management while following norms of social distancing, in order to implement symptom screening at all entry points and minimize the risk of cross-infection. Strategies may include triaging by teams at entry points and subsequent fast-tracking along pre-designated pathways, travel history notices and self-declaration forms at the time of appointment booking, etc.

Clinical Team : The Clinical Team ensures that vulnerable populations are represented in developing protocols related to clinical case definition, testing and treatment, which are the key responsibilities of this team. Based on the relative proportion of patients with Influenza Like Illness (ILI)/Severe Acute Respiratory Infection (SARI) and asymptomatic/vulnerable patients from epidemiologically high-risk areas, outpatient and in-patient testing capacity will need to be augmented and duty rosters for HCWs need to be revised.

Laboratory Testing Team : Comprising members from Infectious Disease, Medicine, Virology and the HICC, this team develops protocols for sample collection, transfer, testing and reporting. It also ensures that testing kits used are available in the required quantities are reliable, validated by a nationally accredited laboratory, and have a minimal turnaround time.

PPE (Masks and supplies) team : The main responsibility of the PPE team is formulating a PPE policy which specifies terms for use, disposal, storage, re-use and sterilization. This policy and implementation should involve coordinating with individual departments to ascertain their degree of comfort with the institutional PPE policy, address any fears or misconceptions and selectively modify the policy in cases where such change is justified. Mathematical modelling to estimate requirement of each PPE item given data on current usage (average usage in the previous 3 months) and projected requirement for the worst case scenario if demand increases by 25, 50, 75 or 100%, given the terms of the institutional PPE policy, case load growth trend, and the number of staff and patients in each location, stratified by risk category, is helpful. In-house testing of sterilization techniques for hard-to-procure or expensive PPE like N95 masks and working with CSSD to implement the sterilization policy are also crucial. We can use information technology (IT) tools to track PPE issue to and use by, individual employees and departments, and ensure strict adherence to guidelines on rational use of PPE.

Environmental Cleaning and Waste Management team : Its mandate is training and roster management of house keeping staff in order to implement the environmental cleaning and waste management protocols of common areas, high risk areas and high touch surfaces put forward by the IPC

team, while ensuring availability of adequate supplies to do so.

Logistics Support Team : Transfer of suspect or confirmed patients between triage, treatment and diagnostic areas requires coordination between the HICC, nursing services, hospital and floor managers, security services and the Environmental Disinfection Team. A Central Command Centre (CCC) pager number which can be activated whenever patient transfer is required can help coordinate all these elements.

Staff training team : Modules for each category should cover core knowledge relevant to their work and daily routine, and liberal use of culturally and linguistically appropriate audiovisual aids (eg. videos or live demos to demonstrate PPE donning and doffing) is recommended. Identifying trained volunteers from within the institution who can be provided with a standard set of slides or teaching materials to teach small groups can help achieve training targets within a short span of time. Pre-and post- test exercises and feedback in paper or online format are important to study the impact of training and identify areas for improvement. Subsequent phases of training are required to address changing protocols and an expanding evidence base.

Staff and student health service (SSHS) team : SSHS liaises directly with the HICC to ensure it is updated on policy changes related to testing and quarantine and in turn communicates the list of tested and/or quarantined staff and students on a day-to-day basis to HICC and the Administrative Team. A subgroup within this team is tasked with overseeing and facilitating home quarantine of staff and students by arranging quarantine rooms for those who wish to quarantine away from their immediate family, and a regular supply of food, groceries and other essential services such as waste disposal for staff quarantined with or away from family.

Staff and Student Counselling Service Team : The emotional well-being of staff and students is an often-neglected area which is nevertheless crucial in order to avoid burn-out, attrition and preventable mistakes in high stress situations. Counselling can be offered in person or online via Chaplaincy department, Psychiatry or dedicated counselling services.

Patient Education and Publicity Team : This team prepares culturally appropriate posters, signs and

videos aimed at patients and various groups of staff, in all relevant local languages. The key areas to focus on are interventions that, if universally adopted, can reduce the risk of infection transmission. For the SARS-COV2 pandemic these interventions were hand hygiene, respiratory etiquette, wearing a mask, and social distancing for the general public, and the appropriate use of PPE (donning, doffing, re-use) for staff.

Pandemic Research Team : All pandemics offer exciting opportunities for Clinical, Economic and Social Research. The research team should comprise representatives from the core clinical departments engaged in treating patients, apart from a data management team which should ensure data is collected, captured and analyzed efficiently. The research team should work closely with the institutional research office and Ethics Committee to ensure research proposals receive expedited approval provided they answer important and relevant questions, are robust in their design and are technically and financially feasible. Where institutional funding is insufficient to meet research requirements, it should connect individual researchers with external funding agencies.

Information Technology (IT) Team : The IT team is responsible for developing applications or IT solutions to solve pandemic specific issues. Examples relevant to the SARS COV2 pandemic included a PPE and hand-rub tracking application, a roster management application that takes into account quarantine and staggered work norms, helping the transport department design new routes based on staffing norms, work timings, and places of residence, developing a tele consultation application, and helping individual departments shift their meetings and educational programmes to online platforms. The IT team also updates the Institutional Website with triaging, testing and quarantine information relevant to patients and visitors, and uploads the latest versions of protocols on the intranet while archiving earlier versions.

Protocols :

Protocol implementation is a complex pathway and involves knowledge of the protocol (achieved through staff training), ensuring that all resources necessary to implement the protocol are available at all sites where the protocol needs to be implemented (achieved through coordination between the administration and various institutional teams) and that the institutional

climate encourages individuals to make behavioural changes required for rigorous adherence to the protocol. This last aspect is the most difficult to ensure, but can be aided by audits.

Audits are an integral component of quality improvement programmes and are invaluable in the setting of a pandemic, where the margin for error is miniscule. The institutional Quality Management Cell and the HICC should be actively involved in auditing all aspects of Institutional pandemic preparedness and Audit results should be directly communicated with the respective teams in order to ensure that loopholes are plugged and protocols modified in the light of audit findings. The cycle of auditing then begins again. In a pandemic, auditing key performance indicators needs to continue in addition to pandemic specific audits on hand hygiene, rational use of PPE, triaging, etc. In addition, Department Quality Managers (DQMs) should be encouraged to Audit their individual departments.

MANPOWER MANAGEMENT : Manpower management requires close cooperation between the Hospital administration, Clinical team, and Staff training team. Management should stagger work schedules based on the priority and categorisation of patients to avoid overcrowding in hospitals. It is very important to create a volunteer corps who are willing to help core teams in pandemic related activities such as protocol vetting, running triage clinics, stitching cloth masks for use by staff and students, developing patient and staff education materials, staff training, fundraising, supporting frontline staff with childcare, groceries, care of the elderly, etc. during this crisis.

MATERIALS MANAGEMENT : Materials management involves ensuring that the institution has an adequate supply of drugs, consumables and equipment to provide uninterrupted, high quality service. In order to achieve this goal, the administrative, finance, HICC and clinical teams have to work closely with the pharmacy, purchase and stores departments. An attempt to provide in-house replacements (eg: use of sterilised masks, in-house preparation of handrubs) should be encouraged to meet demands and cut costs. An IT solution track the usage of critical resources (eg masks, hand rubs) will minimize pilferage by patients and staff.

INFRASTRUCTURE MANAGEMENT : If a geographically separate facility is not available for the triage and treatment of suspected or confirmed

patients, it is crucial to identify areas within the hospital for the same, with a view to achieve water-tight separation between pandemic related and routine services via dedicated movement pathways for staff and patients in order to avoid cross-infection. Existing facilities in outpatient departments, operation theatres, emergency departments, wards and ICUs may need to be upgraded to facilitate triaging and treat suspected or confirmed patients (eg constructing donning/doffing rooms and shower cubicles in isolation wards and ICUs, using partitioning to convert ICU and general ward beds into individual cubicles, converting air-conditioning ducts into single duct units, converting operation theatres from positive pressure to negative pressure areas, providing pipelines and RO systems in order to offer dialysis in pandemic wards). Patients and staff working in pandemic services and quarantined staff should be provided food on-site, to reduce risk of cross-infection.

Challenges Faced by Frontline Workers :

The SARS-COV2 pandemic saw, for the first time, the parallel rise of 'infodemics'. This has deleterious consequences on the morale of HCWs, and those working on the frontline in particular. Each category of staff may have its own set of fears. Ambulance drivers may be wary of transporting suspects to the hospital, housekeeping staff may be reluctant to be posted in pandemic wards and doctors engaged in non-high-risk areas or procedures may demand to be provided PPE reserved for high-risk staff or demand that protocols being followed in the developed world be implemented regardless of the financial costs. Peer-to-peer support, training volunteers within each service group or department to act as motivators, and above all, calm, consistent leadership, are the best antidotes.

Conclusion :

This outline of our experience provides an understanding of how a tertiary health care institution can prepare for a pandemic in collaboration with all relevant stakeholders to develop a coordinated, multi-disciplinary system that can successfully manage a pandemic. We encourage other institutions to adapt these policies and protocols based on their individual needs.

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