

Hospital Preparedness for Pandemic Outbreaks: A Comparative Perspective of National and Global Guidelines

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Abstract:-

➤ *Background*

The study gives an overview of hospitals' preparedness at the national and global levels for newly arising and reoccurring pandemic epidemics.

➤ *Methodology*

Between 2005 and 2020, this study's methodology involved a review of the literature utilizing the PRISMA procedure.

➤ *Result*

A comparative chart of countries was created using the binary coding for roughly 78 preparation factors that were categorized according to WHO guideline by randomly selecting six different nations for review. The results indicate that India's level of readiness is rather low when compared to other nations.

➤ *Conclusion*

According to the research, there is room for improvement in the hospital's readiness in regards to crucial aspects of capacity access and administrative controls, as well as a potential area for policy development.

Keywords:- COVID -19, Hospital Preparedness, Pandemic Outbreak.

I. INTRODUCTION

Pandemics are large-scale disease outbreaks that can increase morbidity and mortality in a particular geographic region and inflict extensive economic, social, and political disruption.¹ This happens every 30-40 years after this. Several devastating pandemics occurred in the 20th century, in particular the '1918 Spanish flu pandemic' which claimed approximately 20-100 million lives with a death rate of > 2.5 percent. Hospitals play an important role in public health response to a pandemic outbreak.² Emergencies in public health impact directly on the health, economic growth, and social stability of citizens. In the last decade, a series of public health crises have challenged the preparedness and response capacities of government departments, hospitals and clinics, public health organizations, and academic

researchers around the world in terms of health systems that need to be strong and definable because the system's capacity to prevent, mitigate, plan for response and strengthen the impact of hospital prevention "Maintaining emergency preparedness of hospitals isn't a static effort, but could also be a dynamic process".³ The epidemics of SARS (coronavirus infection), avian influenza, and now the newest H1N1 flu infection leading to either local outbreaks, epidemics, or pandemics have prompted the International and National Health Care Authorities to frame and prioritize preparations for pandemic preparedness. "SARS dramatically demonstrates the global havoc that a new EID can wreak".⁴

Coronaviruses (COVID 19) is an outsized Community of viruses causing diseases ranging from cold to more serious diseases. Additionally, a single coronavirus may be a replacement strain not previously identified in humans. It is becoming increasingly clear that Coronavirus 2 (SARS-CoV-2) Extreme Acute Respiratory Syndrome is engineered to spread widely. It induces a mild but chronic disease; even when minimally symptomatic or asymptomatic, infected persons are contagious.⁵ Challenges faced all over because of the pandemic outbreak are the financial issues, keeping healthcare workers safe and testing more cases, infection control, shortage of PPEs, and links between pre-hospital care and hospital care.⁶ Hospital preparedness to face biological disasters as well as improving hospital capacity and flexibility in these incidents. Recognizing these deficiencies in hospitals will lead to the recognition of strengths and weaknesses, and eventually to improved preparedness to handle outbreaks of disease.⁷

Preparing for pandemic influenza is needed to effectively reinforce the capacity of the health care system to respond and distribute available hospital resources efficiently.⁸ Failure to plan emergency infectious outbreaks stems from the lack of requirements or guidance for health care and treatment centre preparedness. The acknowledgment of these deficiencies in hospitals would contribute to the detection of strengths and vulnerabilities and eventually to improved preparedness in the management of outbreaks. Moreover, the evaluation of disaster preparedness to improve national health systems would also contribute to the stability of health facilities.⁹ With this background, we propose a framework that systemically

enumerates policy development areas for preparedness and provides an avenue for administrative implications.

II. METHODOLOGY

A scoping literature review is the method selected for this study, and several search strings are used to find pertinent studies. To obtain papers that satisfied the criteria for inclusion, databases are thoroughly searched. Concerning the components and parameters of hospital preparedness, a binary coding and comparative study of the selected countries are carried out.

➤ Search Strategy

A structured literature review and PRISMA protocol¹⁰ based on hospital preparedness for a pandemic or epidemic outbreak. The search studies in PubMed, Google Scholar, Science Direct, and Elsevier databases using specific key words, as a subject headings and general keywords. Based on the research papers selected the gaps were found and the study was designed. All the databases were searched from 2005 to 2020 (march).

➤ Literature Screening, Inclusion and Exclusion Criteria

We screened the literature and included articles in this review if they were (a) studies published in a peer reviewed journals, (b) studies conducted on hospital preparedness for pandemic of six countries identified. (c) studies which on emerging infectious outbreaks or disaster management and health policymaking on pandemic preparedness (d) studies focused on the policy for hospital preparedness (e) national and international guidelines on hospital preparedness for emergency response (f) pandemic preparedness using WHO and CDC guidelines. (g) studies published in the English language only.

Articles were excluded with any of the above mentioned inclusion criteria

➤ Data Extraction

We found 141 articles through searching PubMed (n=65), google scholar (n= 25), WHO (n=3), CDC (n=2), science direct (n = 48) database searching (n=135). Also, we found 6 additional records identified through other sources (Figure 1).

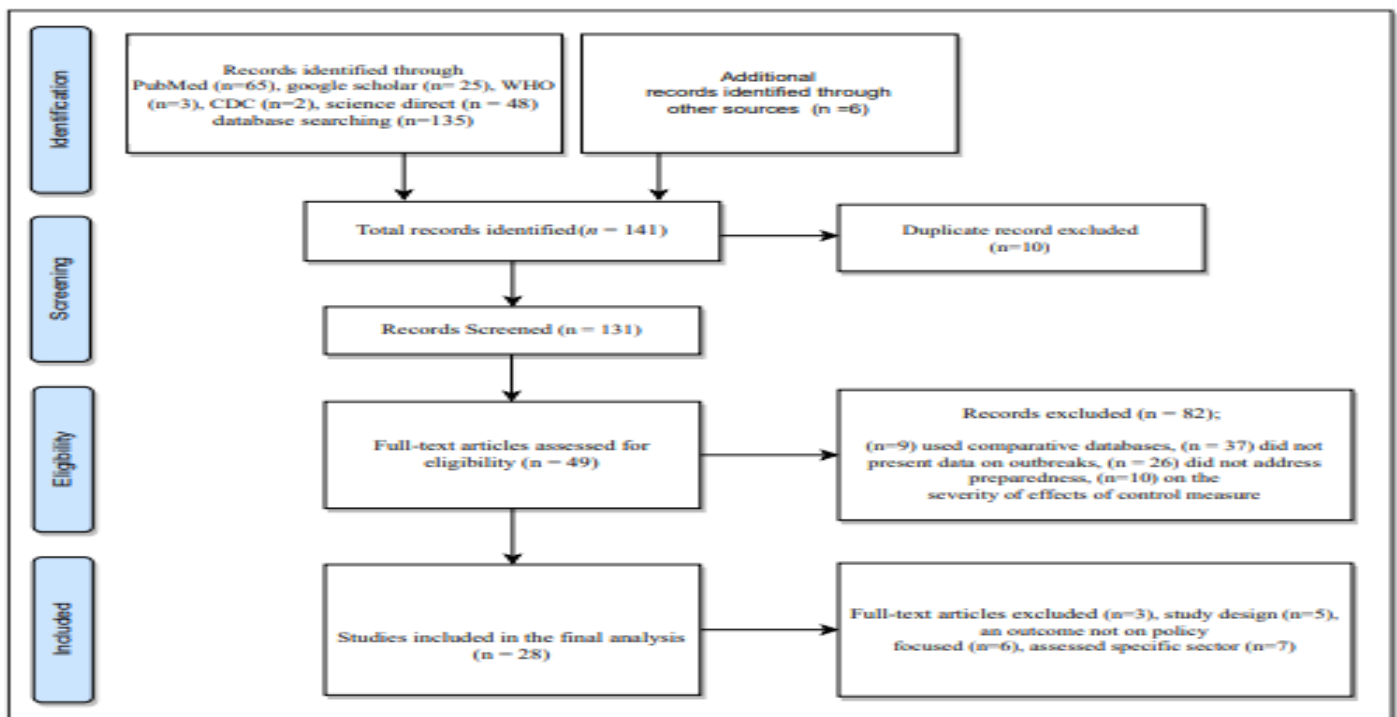


Fig 1 PRISMA Flow Diagram of the Systematic Review

Therefore, the total number of articles primarily considered was 141. Further, 10 duplicate articles were removed, and the titles abstracts of the remaining articles 131 were evaluated based on the inclusion or exclusion criteria. After this step we removed Records excluded (n = 82), (n=9) used comparative databases, (n = 35) did not present data on outbreaks, (n = 28) did not address preparedness, (n=10) on severity of effects of control measure. Lastly, the remaining 25 studies were considered for this systemic review.

➤ Identification of Variables

Six countries were selected purposely for comparative analysis of hospital preparedness and review six articles for each country with national guidelines and literature reviews – India, China, Japan, Australia, USA, and Netherland.

All the parameters variables were considered based on the WHO guideline for the hospital preparedness (n= 78) were fed to the Microsoft excel sheet with six countries. The coding was to check the adherence level of all the parameters variables of preparedness components, the binary coding was done in nature present (1) and absent (0).

➤ *Strengths and Limitations*

We attempted to find as many suitable studies as we could while conducting this review using the PRISMA technique. Our databases and search keywords were expanded, and any differences were actively discussed and rectified. Despite our intention to communicate a global outlook to our analysis, study reliability only allowed us to cover a small number of topics. We chose only 28 papers from 6 different nations since we thought quality assurance of the chosen papers should come first over the depth of the analysis. Given this result, it is questionable whether more studies from a wider range of nations would not have been included by utilizing other databases.

III. RESULTS

➤ *Standards – Preparedness Management*

The hospital is at all times in a state of preparedness to participate fully, efficiently, and effectively in the coordinated health-sector response to an emergency, such as a communicable disease epidemic, pandemic infectious outbreaks. The hospital must have the mechanisms and procedures— including those for more strategic all-hazards emergency risk assessment and specific epidemic event risk assessment, prevention, preparedness, response, and

recovery—that is needed for overall coordination of the hospital’s epidemic/pandemic risk management activities.

Based on the WHO and CDC guidelines, the hospital preparedness consists of 12 components and parameters varying (from 2 to 16) for each. The standards are the – Surveillance, Communication, Triage, Risk assessment, Occupational health programs, Infection prevention control, Surge capacity, Access control, Promotion of care/Continuity of essential care services, Human resource, Administrative control, Education and training.
11,12,13,14,15,16,17,18,19

➤ *Compliance of Preparedness Standards – Global Level*

The summary of the hospital preparedness reported in the articles referred of selected countries(India, China, Japan, Australia, USA, Netherlands) shows the adherence of the parameters of 12 standards gave findings on the 6 out of 12 standard components had adherence to all the parameters mentioned in coding, those are Occupational health programs, Continuation of essential health services, Human resource, Education and training, Assess control, Risk assessment whereas other six components had non-adherences to the parameters of preparedness standards for all the selected countries (Figure 2).

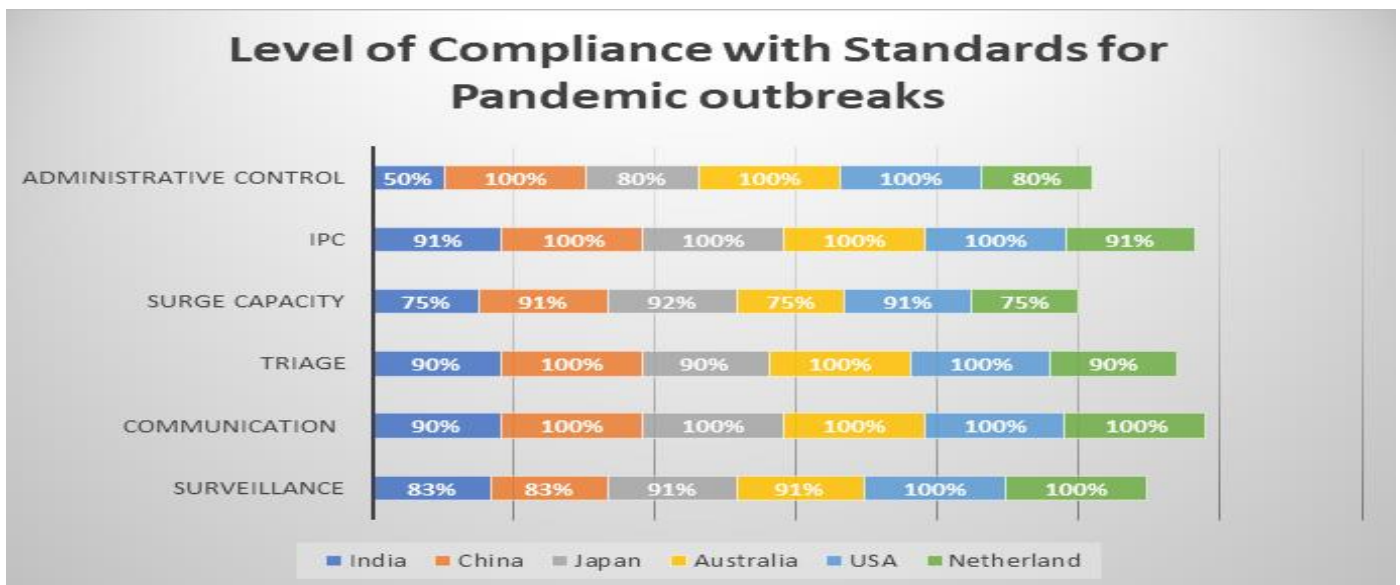


Fig 2 Preparedness Level of Compliance with the Standard of A Pandemic Outbreak

The study found that the hospital preparedness in India is least focused than other countries selected. The graph represents the preparedness level in India that has light spot preparedness in surveillance, communication, triage, capacity, Infection prevention control, and administrative control. In China, 66% of preparedness and moderate focus are in capacity and surveillance. In Japan, 33% prepared and less focused on administrative control, capacity, and surveillance, In Australia, 66% of preparedness and less focused in capacity and surveillance, In US, 83% of preparedness and moderate focused on surge capacity and in Netherlands, 66% of preparedness and less focused in its capacity, infection prevention control, and triage. The adherence of the parameters of the main components for a hospital preparedness is analyzed. The key findings of the

comparison between 6 countries selected for the preparedness level of the hospital show least focused preparedness in India, high focused preparedness in the USA, and moderate focused preparedness in Japan, Australia, China, and the Netherlands.

While, comparison of the components of the preparedness – surveillance component have adherence level to parameters of a shortage of manpower (33%) and prediction modelling (66%), communication component has adherence level of just-in-time training on recognized symptoms (83%), triage component has adherence level shortage of triage manpower (50%), surge capacity component has adherence level to parameters of equipment shortage(33%), an update on surge capacity plans (33%) and

capacity to serve large scale outbreaks(16%) respectively, Infection prevention control component has adherence level of shortage of safety officers(66%), Administrative control has adherence level to an adequate staff-patient ratio (83%) and policy to appropriate measures (83%).

Preparedness level in India is light spot preparedness in all the parameters of six components in hospital

preparedness whereas the USA has a high spot preparedness level lacking based on the study done. The other four countries have two to three components.

The parameters which do not adhere to the standards in Global Level had 4 components on 12 components of standards derived, the countries are USA, Australia, Netherlands, Japan, and China is shown in Table no 1.

Table 1 Standards not Being Adhered to Parameters at Global Level

Components	Non – Adherence of Parameters					
	China	Japan	Australia	USA	Netherlands	India
Surveillance	Shortage of manpower,	Shortage of manpower	Shortage of manpower			Shortage of manpower (epidemiologist), Prediction Modelling
Triage		Shortage of manpower (triage supervisor)			Shortage of manpower (triage supervisor)	Shortage of manpower (triage supervisor)
Surge capacity	The capacity of a hospital for large-scale outbreaks	Update on surge plans	Shortage of equipment, capacity for a large outbreak, update on surge plans	Shortage of equipment, capacity for a large outbreak, update on surge plans	Shortage of equipment, capacity for a large outbreak, update on surge plans	Shortage of equipment, capacity for a large outbreak, update on surge plans
IPC					Shortage of manpower	Shortage of manpower
Communication						Begin just-in-time training on recognizing symptoms
Administrative control						Staff-patient ratio, Policy

Standards that are not being adhered to parameters in Indian Level regarding the hospital preparedness for a pandemic outbreak (Table no 2).

Table 2 Standards not Adhered in Indian Level

Components	Non – Adherence of Parameters
Surveillance	Shortage of manpower (epidemiologist), Prediction Modelling
Communication	Begin just-in-time training on recognizing symptoms
Triage	Shortage of manpower (triage supervisor)
Surge capacity	Shortage of equipment, capacity for a large outbreak, update on surge plans
IPC	Shortage of manpower
Administrative control	Staff-patient ratio, Policy

Based on the gap areas identified, the hospital needs to establish policies that provide a short, broadly applicable vision of what a prepared hospital looks like and describes pandemic outbreak preparedness activities and the below (Table 3) on areas to handle the pandemic infectious outbreaks.

Table 3 Policy Development Area

Standards	Proposed policy development
Surveillance	✓ A Policy on Institution leadership support
Communication	✓ Policy on “Just in time” training on early recognition and symptoms of infectious diseases
Triage	✓ Policy on triage management for pandemic (Infectious) Outbreak
Surge capacity	✓ Policy on hospital capacity for a pandemic infectious outbreak ✓ Application of biosafety measures policy for laboratory
Administrative controls	✓ A policy on Biomedical waste management for infectious outbreaks
Infection Prevention Control	✓ Hand hygiene policy ✓ Disposal of personal protective equipment policies ✓ Quarantine policies for patients and healthcare workers

IV. DISCUSSION

Emergencies happen suddenly and often unpredictably; it is difficult to reveal the effective performance of hospital preparedness in pandemic outbreaks. Also, the preparedness required for dealing with emergencies is different from the normal or static situation. To identify an outcome measure for responding to incidents, it is essential to identify and define standards for the various components of that preparedness.

The hospital preparedness level for pandemics in selected countries with 12 components influenced. The adherence levels of the parameters will be discussed as highly focused, moderately focused, and least focused preparedness of the country.

As mentioned earlier the components risk assessment, Occupational health programs, Access control, promotion of care, Human resource, education, and training are highly focused in selected countries there is no difference, all the parameters are adherence to countries preparedness. Whereas the other six components surveillance, communication, triage, surge capacity, infection prevention control, and administrative control has a difference in parameter adherence level of preparedness. The comparison of components of hospital preparedness with the selected countries (Figure 2) represents the least focused and highly focused preparedness of India and the US respectively.

The articles reviewed included pandemic preparedness from 2001 to 2018

India: The difference is seen in all components of the preparedness level. The adherence level of a parameter is least focused on hospital preparedness to handle pandemics in terms of manpower shortages, prediction modelling, initiating communication, surge capacity to large scale outbreaks and updates on it, patient staff ratio, policy in place to measure appropriate measures. While comparing with the failure of inadequate capacity for health services earlier as a result of waiting for measures to be planned urgently. Limited local capacity has been a major problem in the management of the initial pandemic cases in India²⁰ where the study also shows limited capacity and infrastructure to handle the pandemics in many components when compared other five countries selected in terms of risk communication and administrative controls. Communicating and, managing pandemics in rural area hospitals is a challenge.

China: The adherence level of a parameter is moderately focused on hospital preparedness to handle pandemics in terms of manpower, prediction modelling, surge capacity to large scale outbreaks. It has less focused on a large-scale outbreak in terms of fully trained staff, adequacy of medical stock pills²¹ and the outcome of the study shows the improvement in predictions for a better improvement in the emergency preparedness of hospitals in the country.

Japan: The adherence level of a parameter is moderately focused on a shortage of manpower for triage and update on surge capacity and highly focused on other components. Insufficiency of a large amount of personal protective equipment, space for surge capacity of hospitals, and large supplies maintenance²² and the study suggests the update of surge capacity of the hospital for preparedness.

Australia: The adherence level of a parameter is moderately focused on the shortage of manpower, resources, and updates on a surge for pandemics. Challenge faced in the country by a geographic concentration during pandemic.²³

United States: The adherence level is highly focused on surveillance, communication, triage, infection prevention control, administrative control but less focused on surge capacity to large scale outbreak and resources. The study suggests focusing on evidence-based capacities to combat large scale pandemic outbreaks.

Netherlands: The adherence level is moderately focused on manpower shortage in triage and infection prevention control and shortage in equipment, capacity for large scale, and update on plans. Netherland to improve on its laboratory capacities to overcome infectious outbreaks.²⁴

The CDC states, "For a given gross clinical attack rate, the extensive range between the minimum and maximum estimates is due to the uncertainty of how the next pandemic will spread through society, as well as to the lack of data regarding the impact of influenza in previous pandemics. Such uncertainty and the resultant wide ranges in estimated impact should serve as a warning to planners not to be overconfident in using a single estimate of impact when preparing their plans"¹⁸. In another study "Qualitative Research: Institutional Preparedness During Threats of Infectious Disease Outbreaks", a standardized system was developed to support institutional preparedness during an increasing threat. The use of this system by both curative healthcare institutions and the (municipal) public health service, could help to effectively communicate and align preparedness activities during future threats of severe infectious diseases.²⁵ The study "Preparedness at Japan's Hospitals Designated for Patients with Highly Infectious Diseases", was conducted to assess the preparedness of Japan's special hospitals and develop a more feasible response protocol to any possible outbreak of new or reemerging infectious diseases. not only for Japan but for the global community because of the threat posed by highly infectious diseases.²⁶

In the research paper "Developing policy options for SARS and SARS-like diseases – a Delphi study" was to options for national and international emerging infectious disease policies. New policy alternatives were identified, such as the need for generic plans on pandemics and universal access to healthcare during an outbreak.²⁷ Before an incident, the hospital is required to focus on setting up a comprehensive plan that encompasses all potential threats to organize its response to emergencies. After an incident, an

evaluation of the operational responses may identify gaps in operational capabilities and areas to be improved. Hence, the result shown in table no 5 demonstrates a critical policy development area for Indian hospitals which can serve as an effective mechanism for a hospital to evaluate its readiness and preparedness for a pandemic outbreak.

V. CONCLUSION

Hospitals in responding to the epidemics or pandemics have been analyzed based on a review of articles. The preparedness level of India, China, Japan, USA, Australia, Netherlands is compared for a pandemic infectious disease outbreak. The binary coding analysis shows the least focused preparedness was in India and highly focused preparedness level is seen in the USA and moderately focused preparedness in the rest of selected countries. Combining the preparedness level with the outcomes of increase the surge capacity for large-scale outbreaks, Staff, and resource availability for pandemic outbreaks by all countries selected. The outcome of the study shows the least focused preparedness level is India, a recommendation is to focus on the utilization of the capacities, changes in infrastructure, management of patients in hospitals.

Assessment of preparedness in terms of a) increasing hospital capacities, prediction models, patient-staff ratio, to have a policy in place for appropriate measures could improve management of pandemics in India, b) to include evidence-based practices for large scale outbreaks capacities and resources, c) to increase manpower, appoint triage staff and epidemiologists to handle the crisis. Hospitals should work on preparedness for infectious outbreaks in infrastructure, case management, and administrative controls.

Further directions

➤ *The Future Recommendations for Further Research are as Follows*

- There must be a standardized method to consistently measure preparedness across all hospitals. The framework represented a valid and well-considered measurement tool and should be considered as a consistent standard.
 - Professional organizations should utilize the findings from this research to create a broader forum for discussion about the critical issues of preparedness facing tertiary care hospitals in Bangalore. There also must be more sharing of best practices.
 - Hospital officials must explore feasible alternatives for surge capacity(infrastructure) in the event of pandemics. Community and public health forums should be conducted to involve all entities, not just hospitals.
 - Healthcare officials must be encouraged to access available government funding for preparedness in areas of vulnerability, such as surge capacity and staffing.
- A study on hospital preparedness status global level and consider more than 6 countries preparedness level, work on current threat COVID – 19 and compare its preparedness level to the standards.

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