MANAGING THE SHORTAGE OF BEDS IN HEALTH CARE SECTOR IN THIS PANDEMIC

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ABSTRACT

The study highlights the discrepancies and difficulty in availability of hospital beds due to widespread surge in the number of covid(SARS-CoV-2) cases in different states of India. And the management protocol to overcome the shortage in the healthcare industry. The ways and means of finding solutions for the devastating situation by **creating** and **converting;[1]** huge occupancy living areas and **investing** in providing good, hygienic, efficient single or double bed provision for the patients during this pandemic time (covid).

[**Keynote Words- * Covid, * Shortage Beds, * Creating, * Converting, *SARS-CoV-2, *Healthcare][2]**

INTRODUCTION

With presence of some previous disease history and with discovery of new strains of new diseases have created havoc in countries and in exclusively in India with such paramounting population scenario. The recent advancement in the Covid (SARS-CoV-2) disease have tolled up the percentage in the society upto over 35,109,286 till **[3]** date have raised the question of condition of the patients with symptoms, hospital admission and recovery rate. The first cases of COVID-19 in India were reported on 30th January 2020 in three towns of Kerala**[4]**, from three students who returned from china. After the first detection, there was no looking behind in reduction in the cases rather than much increasing cases every single day.

The Healthcare Industry saw Health catastrophe in controlling the cases as the symptoms were worsened in 2nd wave. There was uncontrollable signs related to respiratory system**[5]** found in almost all patients . This in turn needed hospital admissions as every individual patient showed different symptoms.

So, in turn the Healthcare Sector started showing performance in the hospital administrative system due to overwhelming In-patient records. Especially, the patients admitted were far left behind in getting a sitting area and beds too. The country's health infrastructure in present day has cracked down under the burden of the second wave and is stretched beyond its limits. The shortage of **oxygen-supported beds**, **ICU beds**, **ventilators and medical oxygen[6]** has crippled hospitals in several cities as they fight to save patients. The Healthcare Industry is trying every bit of air to create more number of rooms, beds and care giving sections in hospitals to maintain life expectancies.

But, the big question arises where are they failing behind? Why there is such famine situation still arising even after persistent effort by the government. Why are patients forced to languish outside hospitals for hours and days, while their family desperately searches for a bed?**[7]** Why are ventilators and essential medicines in such short supply? What are the factors contributing in creating such situation. What more can be done? And what modifications, which kind of strategies should be followed by the Healthcare Authority to curtail such breathe taking scenes?**[8]**

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2)[Keynote Words- * Covid, * Shortage Beds, * Creating, * Converting, *SARS-CoV-2, *Healthcare

3) over 35,109,286 till

4) 30th January 2020 in three towns of Kerala

5) uncontrollable signs related to respiratory system

6) oxygen-supported beds, ICU beds, ventilators and medical oxygen

7) desperately searches for a bed

8) should be followed by the Healthcare Authority to curtail such breathe taking scenes?

LITERATURE REVIEW

The study shows the variables which are taken in data form for the implementation of rules and methods in overcoming the shortage in hospital bed availability. Factors like-

*Which are directly impacting the hospital stay of the patient.

*The co-morbidity factors present in the medical history of the patient

*First line Management of the symptoms that require less hospitalisation**[9]**

* Home Isolation**[10]**

*Vaccinations per human population (age specific; above 18 and above 45 years)**[11]**

*Making use of available resources and converting other non- essential helpful areas into covid sections.

* Rate of surveillance and tests done per day.

* Taking account of travel history of people, social gatherings and inter-dependable variables attached to them like number immediate isolation after detection of infection, masking.

* Lockdown, curfew and section 144 imposition in various states , which reduced hospital admission and reduced spread of the infection in population, thereby improving the availability of beds for more serious and needy patients.

* Mild, Moderate and severe cases were categorised and accordingly survey was done to estimate the hospital stay for each type.**[12]**

*State wise regulations and beds availability in **Urban**(Hospitals total-21,403; Beds-2,65,275 and **Rural** Areas (Hospitals total-4,375; Beds-4,48,711)**[13]**

Statistical surveys from parliamentary documents and from the Health Ministry showed the specific Data like

*As on September 22 last year, India had 2,47,972 oxygen-supported beds. By January 28 this year, the number fell to 1,57,344 -- a decrease of 36.54 per cent.

*In the same period, the number of ICU beds for Covid-19 patients saw a decrease of 46 per cent, falling from 66,638 on September 22 to just 36,008 on January 28.**[14]**

*Combining the number of oxygen-supported beds and ICU beds, there was a 38 percent decline in just four months.

*Besides this, India had 33,024 ventilators as on September 22. By January 28, the number fell to 23,618 which is a decline of 28 per cent. Deterministic compartmental models such as Susceptible-Exposed-Infectious and Recovered **(SEIR)[15]** are widely used to provide insight into disease progression and are chosen over complex models due to minimum number of assumptions which are available. The interventions comprises of two types of strategies

A) Suppression, which aims to reverse epidemic growth, by minimizing the effective reproduction number (average number of secondary cases each case generates), to below 1 and thus, reduce case numbers to low levels and maintaining that indefinitely**[16]**

B) Mitigation, which aims to slow the spread of epidemic with the rationale of preventing significant overload on health system and gradually allowing the population to develop herd immunity. By use of mask, social distancing, less exposure, increasing testing, early diagnosis.**[17]**

*** First line Management of the symptoms that require less hospitalisation[9]**

*** Home Isolation[10]**

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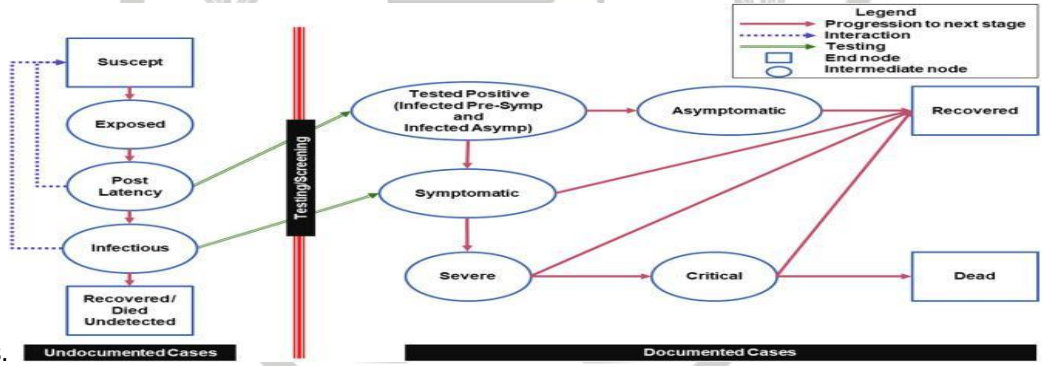
RESEARCH AND METHODOLOGY

The research Methodology used to study this context used very specific and known variables which could give the exact management results for bed shortage. The formula that was followed was the transmission dynamics model for the outbreak of COVID-19 in a heterogeneously mixing population. Compartmental disease models divide population into groups, based on each individual's infection status and track the corresponding population sizes through time. Variables used in the SEIR model in which the population was divided according to the infection status into-

[*Susceptible(S)**[18]** *Exposed (E), *Gap or Latency period, *Number of infected people (I)**[19]**,* Quarantined at home**[20]***Removable was employed in the study]

The susceptible individuals got infected with the virus on spot , and in the latency period showed symptoms which resulted in either isolation or hospital admissions. The age criteria was also taken which showed a mixed population exposure**[21].** This variables gave different and mixing assumptions in the model dataset which was used to identify the corrective management protocol for shortage of beds which was directly proportional to the infection control strategy. A diagramatic and table plot was created to know the vulnerability of various sub categories of people under the above mentioned variables.



The documented part mentioned are determined and constrained by the testing. Factors like pre-symptomatic, Symptomatic and Asymptomatic. Pre-symptomatic and Symptomatic may result in severe and critical state before or after hospitalisation**[22]**. Numerical values were taken for each testing categories like Tpi for Positive, Asi for Asymptomatic, and Ssi for symptomatic, Svi for severe, Cri for critical, Di for dead and Rdi for recovered was mentioned. Mitigation factor such as social distancing, the contact matrix is divided into household contacts, workplace contacts, school contacts were also taken.

Model parameters and Data-The parameters and data set were collected from a meta analysis study done on some cases on Covid-19**[23].** The data collected was on confirmed positive cases, hospitalizations, recovery and deaths from publicly available time series data. The other model parameters such as latency rate, testing rate and rate of recovery/death were estimated using crowd sourced Indian data (COVID-19 India Tracker). However, in this scenario, asymptomatic were not considered infectious. In a pessimistic scenario where R0 = 4 and asymptomatic cases are infectious, cumulative incidence and peak prevalence are only reduced by two and eight per cent**.** In this case, the

projection of the epidemic duration (time over which the prevalence of symptomatic COVID-19 infections is >1 case) was only approximately 1.5 times longer (ca. 550 days) than without quarantine intervention .Other model data were collected from various lockdown scenarios in different states. Average length of stay data on the daily turnover rates for mild, severe and critical

cases were set as 11.76 days, 17.76 days and 17.76 days respectively (parameter values from model)**[24].** Using population-weighted age-stratified probabilities, parameters like number of cases requiring hospital beds, ICU beds and ventilators were taken too.

*** Susceptible(S)[18] * Number of infected people (I)[19], * Quarantined at home[20] * Quarantined at home[20]**

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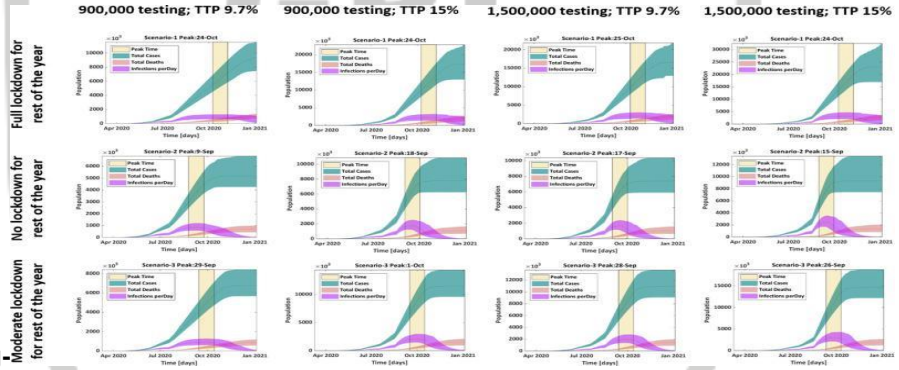

Modelling-

As the parameters were taken on different lockdown scenarios, the above presentation showed the percentage of lockdown and its effect on the spread of the infection. This showed testing in proper time, regulations and lockdown affects the control of widespread hospital visits and more chances of of atleast minimum needful bed availability.**[25]** To contain the spread of the disease, ICMR reviews and updates the testing strategy periodically. Accordingly, ICMR defined criteria for testing asymptomatic patients and patients with influenza-like illnesses on 20 March and 9 April, respectively. ICMR conducts an IgG ELISA test sero-survey to estimate and monitor the pandemic within specific population groups.**[26]** The first results show that 0.73% of the enrolled 26,400 individuals were contracted with SARS-CoV-2 leaving a large proportion of the population still susceptible. However, the risk of infection is 1.09 and 1.89 times higher in urban areas and slums, respectively. The surge capacity, which is determined by trajectory of cases and infrastructure dedicated to COVID-19 patients by accessing the time period around which Indian hospitals will face serious crisis in terms of availability of beds and ventilators is shown here. The capacity-need gap during peak time can be managed if the social distancing measures and restrictions are continued for rest of the year for mild, severe and critical cases.**[27]**

*** meta analysis study done on some cases on Covid-19[23]. *11.76 days, 17.76 days and 17.76 days respectively (parameter values from model)[24]. *of atleast minimum needful bed**

availability.[25] * sero-survey to estimate and monitor the pandemic within specific population groups.[26 distancing measures and restrictions are continued for rest of the year for mild, severe and critical cases.[27]

CONCLUSION-

The proportion of all variables when understood tells us that no one value is responsible for the outbreak of the pandemic and not only few but random discussion has to taken to conclude the managerial methods for supply of beds. The study calibrated the model to preliminary data arising from outbreak in India in order to project the need for hospital resources under some transmission curve scenarios- No lockdown, Moderate lockdown and Full lockdown across varying testing coverage.**[28]** It also evaluated the extent to which the full lockdown and moderate lockdown delays the peak of outbreak, thereby, prolonging the window of time to augment the health-system capacity in order to accommodate the surge in need during peak period. Most importantly, getting prepared with the testing kits, timely surveillance.**[29]** The bed shortage estimation can be correctly made when high levels of public awareness have been reached and the curve dynamics only result from different time spent waiting for hospital beds and/or testing kits. Dependency on lockdown is fairly fruitful as it gave temporary management. Model data and plotting are rather a necessary input to guide policy decisions. Proper isolation, restricting the travelling duration and frequency social-distancing measures and shelter-in-place orders are effective in dampening demand, which are important part of the solution. It is still necessary to manage the way patients enter and proceed through the various nodes of the health care delivery system.**[30]** The study is further extended to map the geographical accessibility of facilities providing COVID-19 care, specifically partial accessibility or other means for critical care and bed availability in various states. The more challenging scene faced by the government is the viral spread of the infection and to keep a record of it in a more rigorous format that can be implemented in the healthcare sector. Converting some non- essential available areas to bed allocation wards. The data and various parameters taken showed the lineage in controlling the factors and their relations with maintaining the hospital beds.

From the study findings, it was estimated that some policy making recommendations has to be implemented –

* determine the maximum number of inbound flights that can be allowed to avoid transmission.

* Increasing the strict screening and testing of inbound passengers and local symptomatic , suspected people for a minimum of 2 weeks and maximum of 4 weeks.

The evaluation shows that a proper emergency and preparedness response plan is essential to avoid catastrophic loss in the health sector, which India must integrate into its core public health program.**[31]**

*** No lockdown, Moderate lockdown and Full lockdown across varying testing coverage.[28]**

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*** the various nodes of the health care delivery system.[30]**

***which India must integrate into its core public health program.[31]**

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