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Operational Re-Engineering of Hospitals during COVID - 19 in India– A Review Article

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Abstract:
Background: COVD 19 has ended up becoming one of the biggest challenges that the world has had to face, universally. To tackle the potential challenges that COVID-19 may bring forward to any healthcare institution, hospitals are to structure their operations strategically, operationally and monetarily so as to somehow survive and arise on top, especially in these trying times.
Aims & Objectives: This systemic review aims to address the changes that Hospitals need to imbibe for smooth working under the stressful times.
Methods: A systemic review was conducted in the field of COVID-19 and changes that this pandemic has brought in Indian Hospitals. The target was specifically on OPD and Emergency Department. 70 articles were referred and only twenty-four were thoroughly studied to focus on OPD and Emergency Department of Hospital.
Result: Hospitals in India were caught off guard in the wake of confusion that erupted due to the emergence of this global pandemic, however, as time went by, hospitals started embracing and adopting the process of reengineering. These changes ranged from variation in lounge areas, OPD, manpower and so on. Almost every aspect of the hospital has been altered by new operational changes, rules and regulations put forward by Government of India.
Conclusion: With proactive patient administration being the definitive goal, The Indian Hospitals have to re-engineer themselves to sustain all challenges like this Pandemic. Hospitals should reengineer themselves operationally, strategically with considering overall approach of patient safety and satisfaction.
Keywords: Operational Re-engineering, COVID-19, Hospitals, OPD, Triage.

Introduction:

The novel coronavirus is one of the newer viruses that have propped up in the world, having a close relation to certain strains of viruses responsible for Severe Acute Respiratory Syndrome (SARS). The first cases in the world were discovered in the city of Wuhan in China in 2019, and

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the virus responsible for the infection was named COVID-19. The first instances of coronavirus infections were accounted for on 30th January 2020, in India. (BBC NEWS) Since then, cases have been propping up all over the country, multiplying on an extraordinary rate. Indian emergency clinics were caught off guard in such a situation. The COVID-19 virus is peculiar and novel in the fact that up to date, there is there has not been any particular cure or treatment for it. Hospitals should hold steady so as to handle COVID cases as well as non COVID patients and their requirements too. Potential methods of transport incorporate faeco-oral courses, fomites, contact, and respiratory beads. New speculations of COVID-19 being air borne have also surfaced. As compared to other countries, the Indian Healthcare framework comes up short when dealing with the fundamental wellbeing of all its residents, taking into account its constant expansion, even in the wake of COVID-19. We need fundamental assets like, manpower, foundation, and accounts to adapt to face Pandemic.

After the initial few months of the pandemic, the number of walking care patients declined by 60 percent all over India. Individuals are frightened to visits Hospitals and dread that they may contract COVID in medical clinics. According to newspaper and print reports, nursing homes in tier two and three urban communities have been shut down because of absence of patients and furthermore incapable of remaining open due to monetary losses as a result. Hospitals must adopt and function smoothly to serve NON-COVID cases as well.

Hospitals are experiencing significant changes operationally and strategically. Operational changes that could be adopted in the outpatient department of these hospitals are going to be discussed in a nutshell after basic assessment of literature available in the field. This review presents in details about how hospital process reengineering was done or is being done in Indian hospitals abiding to legal guidelines.

Methodology: A systemic review was selected as the pandemic is rising and conducting on field research was bit risky pertaining to rising COVID cases in India. As the topic of study is raw, the wide range of information is scrutinized and narrowed down to 25 papers according to the research aims and objectives**.**

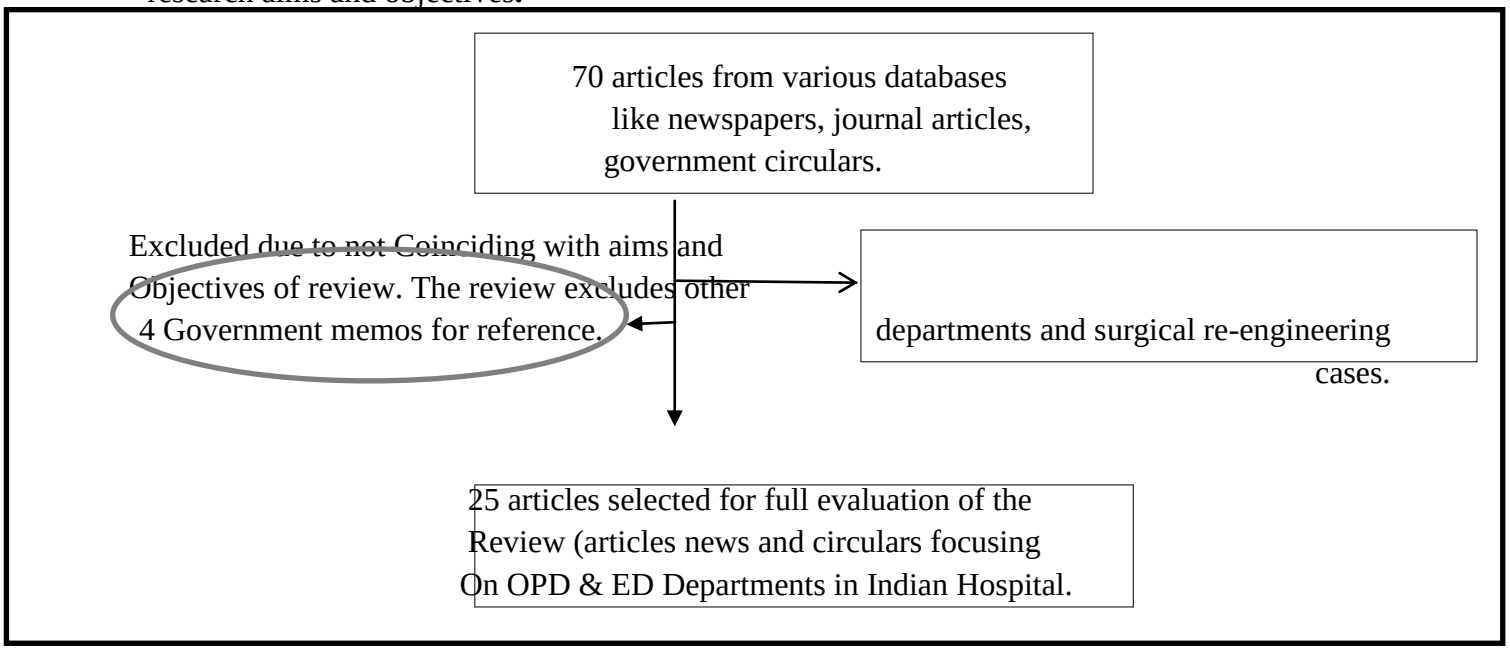

Figure 1.1 Flowchart for review

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OPD PLANNING:

The OPD department in a hospital is always the first line of contact to patients. Ambulatory care department where patient is diagnosed/& or treated but never allowed to stay. OPD is also referred as the windows of a hospital. Successfully overseeing persistent stream in an outpatient unit is a vital aspect for accomplishing operational greatness just as guaranteeing clinical quality. It is particularly so for an outpatient office in an enormous hospital as it handles huge volume of patients with a differing case mix.

Taking into consideration the first point of contact in the hospital that a patient deals with, the entrance and considering an Example of the Apollo chain of Hospitals, manpower in the entrance was replaced with a Robot that scans the patient while entering and allocates a smart card, OPD room number and sometimes provisional diagnosis at the entrance itself. The instruction and physician appointment is immediately generated to patient he/she is then on the basis of provisional diagnosis, allocated to the physician

Provided below are other examples that hospitals have adopted to sustain themselves in the wake of the COVID pandemic:

a) Sign Boards- Digital and also manual sign boards are displayed at entrance, OPD, WAITING Rooms which provide all instructions about COVID 19, social distancing, wearing mask, instructions to follow, do's and don'ts. They also covey directions to rooms and OPD numbers and also information about COVID patients and Non COVID patients in Hospitals.

b) Accompanying person- The patient if able to go alone, is advised to do so and not with an accompanying friend/ relative to avoid crowding in hospitals. The relative or person accompanying is requested to wait outside the hospital. Arrangements are made and guards are positioned outside the entrance to check the patient's appointment or the accompanying person's necessity.

c) Registration Desk- Glass partitions/ fiber blocking windows are been installed at registration desk to avoid the crowding of patients and also relatives seeking information. PPE is strictly advised to the person sitting at desk.

d) Waiting area- Hands-free sanitizers are installed at points in every room. New norms like masks are compulsory, patients only allowed as per appointment with doctors. Patients are allowed to wait 6 feet apart following social distancing norms. Waiting lobbies are well ventilated with no usage of air conditioner for obvious reasons.

e) Air filters- HEPA filters can be installed at entrance of hospital as well as in doctor's OPD. This is particularly useful to filter droplets or other viruses and bacteria .Also these can be

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installed at entrance of different examination room and waiting rooms.

f) Additional areas and lobbies have been converted into waiting rooms. And more space is made available for transportation of patient with the prime objective to minimize patient movement as much as possible. A pre decided manual and SOP are set for patient flow and movement.

g) Visual Signage- This is a very useful method that is adopted in waiting area, OPD and Examination rooms. Visual signs and symbols are marked in attractive colors and indicate instructions such as “Stand here”, “wait here”, or “sit here”. Pre-existing signage like OPD room numbers, layout can also be used innovatively.

h) Manpower- Protection of administrative staff, clinical staff and even class four workers should be the priority. Apart from normal medical staff, even class 4 workers are being trained thoroughly with infection and disinfection protocols. Sodium Hypochlorite solutions mixed with disinfectants are used for cleaning every shift. Workers shall be trained for infection control and cleaning of all surfaces. A new post can be designated to nursing officers for OPD Department. All roles and responsibilities are to be assigned to him/her. The staff also has to work in shifts to avoid crowding. Infection control committee will be active and head the overall operations of cleanliness. Shortage of staff must be anticipated and plan must be designed to face this shortage like relocation of staff from other departments or allocation of staff on contract or short-term basis can be few measures taken to cope up with shortage.

FEVER CLINIC/ FLU CLINIC:

A novel and potentially beneficial initiative put forward by certain hospitals in India. A flu clinic is set up at the entrance which will mitigate the risk and assess the patients before entering the hospital. They have a physician, nurse, instruments and all staff with PPE and mask. This room has a negative pressure with ventilation and natural light. It is a standalone clinic with clear pathways that doesn’t interrupt the functioning of the hospital**.**

SURGE CAPACITY:

Every hospital in a pandemic is working to its maximum capacity. As per definition, surge capacity is when patient volume increases to such an extent that the hospital can no longer comfortably accommodate it.

Nowadays, hospitals are planning and increasing the number of beds, utilizing grounds, parking spaces for more beds and facilities, isolation wards. Normal wards are being converted into isolation wards and hospitals are trying to manage every inch of available space following the government's norms. Surge capacity is enhanced by reverse triage, adding beds, temporarily converting religious places into hospitals.

Isolation wards created are separated for confirmed and suspected cases. These wards can be designed away from patient flow and also well monitored by the in charge responsible for the respective wards.

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INCIDENT MANAGEMENT SYSTEM:

Indian hospitals lack the concept of Incident Management System. If hospitals have such a system in place, it still lacks proper implementation. COVID-19 has taught us the importance of Incident Management System in daily reporting of COVID patients, cases and deaths. This system can also be utilized to convey messages to staff, doctors and nurses. Incident management system can overcome communication barriers between the administrative and clinical staff. This system can act an interconnecting link in all departments. (WHO, 2020) Various messages can be sent through it. Codes can be activated and deactivated. This can be a major breakthrough as the public can also be addressed and the messages can be delivered loud and clear without creating chaos about any situation.

TRAINING:

The importance of training of staff nurses, doctors, and administrative staff has been re-iterated in healthcare institutions time and time again. Proper hand washing, managing disasters, patient and crowd management, waste management, PPE Training & Disaster Management among other subjects are provided as training to various levels of hospital staff. Currently, Indian healthcare workers affected due to COVID-19 contribute to about 0.82% of all active cases. (WHO) Thus, staff needs to be protected to serve the affected to deliver superior care making staff preparedness and grooming play and pivotal role in providing this care whilst minimizing risk. Public health specialists must be appointed to convey the rate of infection and surveillance if all cases, tracking patient's flow, their movements should be supervised by him/her. Also, he will be the official spokesperson on behalf of the infirmary

LOCATION POOLING:

This concept is nonetheless to be applied in Asian country however is often thought- about in management of OPD department in times of COVID. All necessary services are often clubbed together in OPD department to avoid patient transport conjointly to serve higher and in one place. (Review, 2020)For instance, a patient is advised blood test, therefore his blood samples are collected in same examination space and to laboratory for test. Also the results are often sent through email and affirmative in conjunction with consequent appointment date. This concept is to minimalize the patient and staff movement and provided facilities at one centre.

EMERGENCY DEPARTMENT PLANNING:

Emergency care covers wide activities like Prehospital care, initial evaluation, first aid, diagnosis, resuscitation and in hospital care. (WHO - Emergency care) Emergency department plays a pivot role in any big hospital setup. It plays an interface between the outpatient and inpatient department of respective hospital. India requires a lot better emergency care as per the current scenario the emergency care is fragmented. Also the private hospitals perform better than government hospitals delivering emergency care is a topic of debate.

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Pre-Triage:

The goal of pre-triage is early identification and isolation. In this pandemic all hospitals and staff should treat all cases as suspected and follow proper criteria of pre-triage. Here the entrance is segregated for normal Emergency Department and COVID ED. Every hospital has made or in the process of making this big infrastructural change. A predesigned nurse or doctor can be assigned at pre triage desk at entrance to ask about questions and fill up self-declaration form about questions asked like travel history in last 15 days, thermal screening, SPO2 levels, flu symptoms. (Mathew, R., Sinha, T., Sahu, A., Bhoi, S., & Galwankar, S. (2020). Coronavirus-19 pandemic: A two-step triage protocol for emergency department. Journal of Emergencies, Trauma, and Shock. https://doi.org/10.4103/jets.jets_33_20, JUNE2020) A checklist is made by some hospitals with same base line like the symptoms, age, co-morbidity, etc. Patient is then sent to normal ED or to COVID ED according to the checklist results. Pre-triage can be an important step is limiting the cross infection of confirmed COVID cases to non-COVID cases and also to healthcare workers. Use of telemedicine can also be an option is adopted by some hospitals. A separate pre-triage system in hospitals will definitely play an important role in preventing cross infection.

PRE-TRIAGE CONCEPT

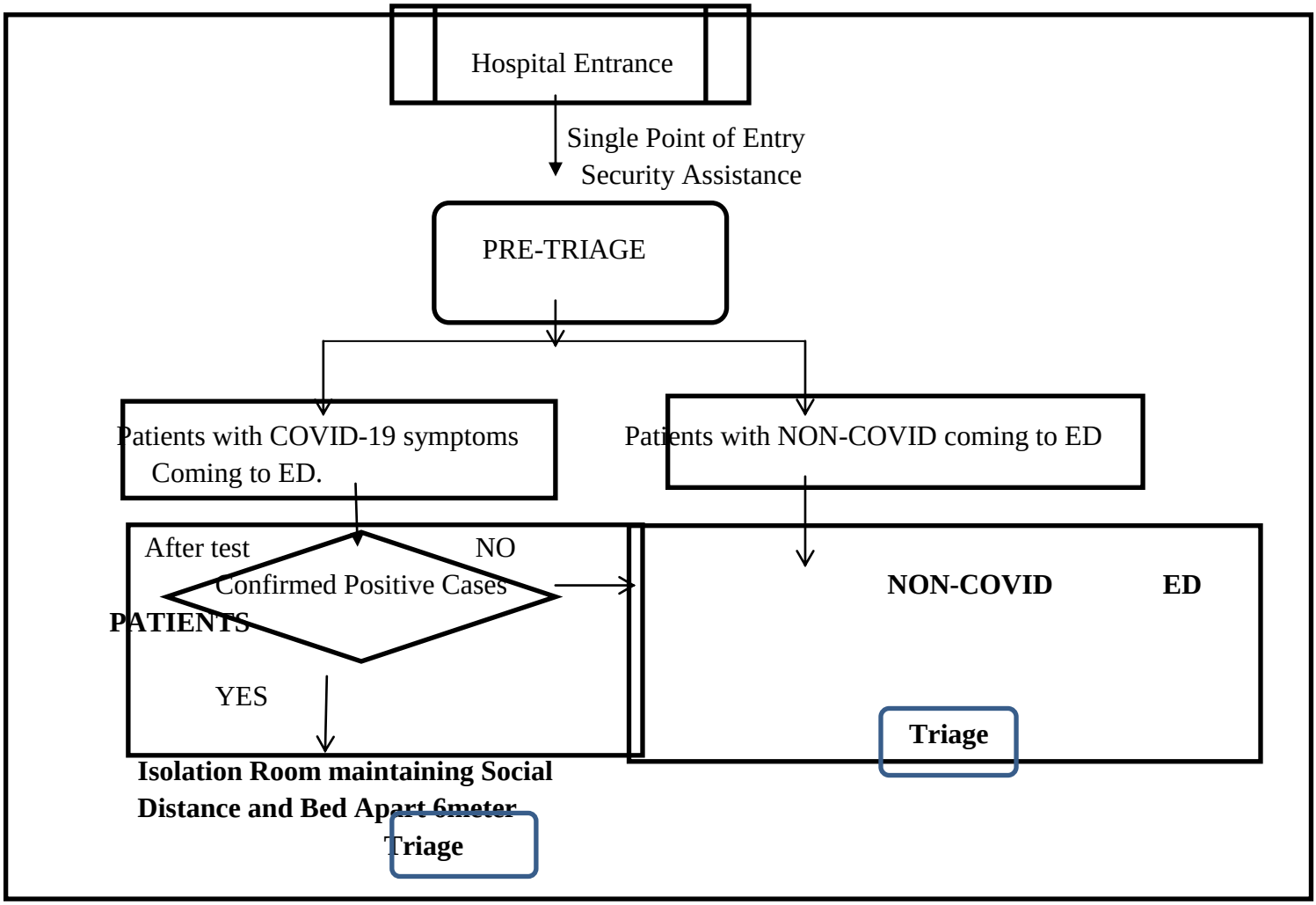

Figure 1.2- New Concept of Pre-Triage

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TRIAGE:

Hospitals should keep the very important point in mind while designing SOP's about triage that triage protocols are different for epidemic and for trauma. As the world is facing COVID-19 viral epidemic, the protocols should be adjusted and adopted according to government norms of social distancing and following the pre-triage system. As mentioned in pre triage, separate entrance for normal ED and COVID ED. This allows limited contact of patients. Also pre triage desk can be the limiting entry point. Limiting the unnecessary relatives accompanying patients can be done at pre-triage desk. In-order to make emergency system a well prepared one it should be re-designed following all protocols of government and WHO checklist. All healthcare staff working should be wearing PPE kits and following infection control protocols. Triage will allow doctors to focus on emergency care patients needing urgent attention. But COVIS-19 triage will also work on similar baseline with little modification like asymptomatic patients being GREEN, who need no ventilators or special attentions. YELLOW patients will mild/moderate symptoms use ventilators if available and moderation is necessary for these patients. RED being severe cases, with pneumonia likes symptoms that should be kept on ventilators and need immediate attention and treatment.

Epidemic triage is made from past epidemic experiences like Influenza flu and Sarc 2003 epidemic. These diseases except taking lives gave Indian heathcare systoms to tackle epidemics. But the hospitals and government stayed negligant and weren't buckled up for such a disease which is now a pandemic.

a) MANAGING INCREASED PATIENT VOLUME :
   One of the first problems faced in ED department og hospitals during COVID-19 is crowding of patinets due to the fear of being COVID positive. Even minor flu like symptoms patient showed and this created over crowding and extra burden which the hospitals weren't ready for.Pre-triage and traige helped to manage patient flow and also systematically seggrate the confirmed, suspected and non-Covid cases.

b) PATIENT IDENTIFICATION: (Redesigning emergency department operations amidst a viral pandemic, 2020)
   Triage is the key to identify and limit the spread of infections.But in COVID-19 mant cases are asymptomatic so it becomes difficult to locate and isolate them. Also this may cause unnecassary space unnecessary quarantine and iproper use of ED facility. Low risk individuals must be identified and suggested home care and home quarantined.

c) COHURTING:
   Even in isolation the distance between the beds should be atleast 2 meter apart. Also a physical barrier like curtain is recommended to avoid infection and gain privacy. Within a single quarantined room, the gudelines are blury about how a suspected patient awaiting the result and patient whose test is negative should be kept. So it depends on the strategical planning and decision mking of the Emeregency officer.
   No hard and fast guidelines have been dragted it is soley the duty and SOP set by hospitals to plan and keep such patient and cases away.Cohurting looks simple but a crutial step in isolation wards.

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d) STAFFING PATTERN

Hospital should divide the staff into three categories: Dealing with COVID patients, dealing with non-COVID, dealing with suspected cases.

This division will have clear the training and the drills that need to be conducted for those workers.ED administration should have a system to evaluate and monitir this staff if they are wearing proper PPE, complying with infecction control protols and hand hygiene training. Also this staff shoud not be over worked and given appropriate compensation of work, which is an issue in governement hospitals. Doctors, physicians are overworked and underpaid in India.Adequate training, PPE kits and proper evalutaion and implementation is the key for overburning of staff and resources.

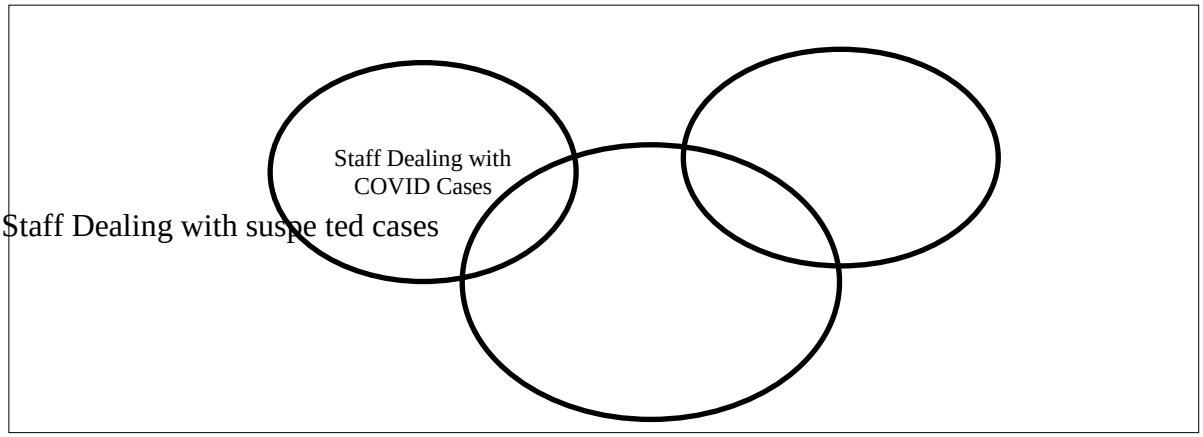

Figure 1.3 Staffing arrangement In Triage Room

e) VENTILATION:

Isolation rooms should have a proper system on exhaust and air conditioning as well. Most private hospitals have centralised ac. But as this can be airborne infection, the usage of ac is not adivisable and droplet size is small and it can stay on innate surfaces for as long as 8 hours. So controlled natural ventilation with unrestricted opening on opposite side with >20% of floor area ensures less risk. Also ultraviolet germicidal irradication has been shown to reduce airborne viral infection.Also feneral ventilation recommendations to prevent airborne prticles are >=12air changes per hour. (Welfare, 2020) These guidelines are not sufficient as the strains or virus react differently to different air temperatures. Byt yes, hospitals are keeping no stones unturned to follow and protect the patients.

f) LOGISTIC MANAGEMENT:

Main goal is to provide right resources, at right time and right quantities to satisfy the ever increasing demand of PPE, medicine, ventilators and essentials. Logistics calls for proactive measures and approaches to achieve proper inventory and at right time and quantities. C0-ordination between all departments and also the staff co-ordination is the key for successful logistic management. Surge capacity in beds, as well as materials, PPE Kits, N-95 Masks, Sanitizers, Disinfectants, Uniforms, Beds, Linen, IV fluids, medicines are to be maintained at adequate levels in all Hospitals. All vendors are to be kept in close contact and reachable

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if crisis supplies are required. Supplies are to be managed using a 'Just in time' (JIT) strategy, for inventory management. Make in India Has helped stimulate domestic manufacturers to produce PPE Kits and Masks, however, Ventilators are as yet deficient due to the lack of manufacturing capabilities in this sector. Apart from JIT this pandemic the markets saw the strategy called BULLWHIP EFFECT. Here the demand is very high, so the pharmacist or even hospitals stock up the essentials like medicines, ventilators, masks and sanitizers. The first phase of COVID -19 showed emergence of bull whip effect in India.

Calculated pooling is likewise an elective technique that medical clinics are attempting to adjust, to manage the deficiencies in essential inventory. All fundamental of prescriptions are put away and in abundance to satisfy the future overabundance need of patients.

INFECTION CONTROL:

Class iv staff especially should be trained and timely monitored for cleaning and disinfecting isolated rooms, emergency department and outpatient department as well. The disinfection with 1% sodium chloride and other alcohol bases solutions is recommended. Time and again it has proven that hand hygiene is most basic and most important infection control that the staff need to practice and also infection control team should monitor and supervise minutely over all process. PPE kits donning and doffing should be practiced and preached. Hospitals should follow WHO guidelines and must monitor and track the compliance of staff and patients over the same. Enhanced hand hygiene and surface decontamination plays pivot role in safety (COVID-19 Healthcare Planning Checklist, 2020). Infection committee in co-ordination with disaster manager committee of hospitals monitors infection control protocols and conducts weekly training for staff regarding the same. Also monitoring and evaluation is and should be done to avoid the spread of infection.

PSYCHLOGICAL SUPPORT:

This new concept is been brought up into focus by many Indian hospitals. The pandemic, the lockdown imposed, the guidelines, coping with the new normal is not all difficult to patients but also staff and hospital crew. So many hospitals have come up with special provision for quarantined patients or even for staff serving and working for these patients. . Sessions include setting up yoga sessions for them, trying the new sun ways to interact while maintaining social distancing. Setting up counselling sessions with task that keep the patients engaged. A group therapy is something theses hospitals have come up with. All if they need a tele medicine session can be arranged in 1 to 1 basis. The effectiveness of such practices has not been studied but yes the isolation, being away from family can be challenging for few. So providing psychological support can be an innovative solution unseen mental problems. Denanath Hospital in Pune conducts such yoga sessions and breathing exercises to all staff and patients. This proves two ways beneficial by providing stress free environment in work place and all breathing exercises can be good to increase lung capacity and develop immunity to tackle such infections.

DISCUSSION:

Medical clinics and hospitals are to be accepting towards new ideas and changes and operational reengineering can be a significant stride in the right direction. This pandemic the world is confronting won't end any time in the immediate future; therefore, embracing a new ordinary is

the route ahead. Risk reduction as much as possible' should be the axiom driving the Hospital Administration and the Health Care Personnel while managing COVID-19 patients. Elimination or substitution of the hazard is not possible at this phase of the pandemic.

Telemedicine is been practiced and preached. Tele-medicine bundles with various offers can be beneficial to anybody with network availability. Appointments can be made; the specialist can be consulted without the risk of exposure. OPD video conferencing arrangements are another mode of development hospitals are experimenting on, so as to embrace work without hazards. Government of India has drafted new laws for telemedicine and is supporting the digitization of healthcare. Telemedicine is helping patients to consult for minor complaints. The fact of the matter is, regardless of whether these SOP's, rules and measures come into play, will they be followed? Will these measures be adequate? Or do Hospitals need to think and act more proactively. Can innovation with the assistance of computerized reasoning prove helpful in such desperate circumstances? This can be another topic of study.

The significance of a dependable EMS can't be overemphasized, particularly in India where the administration has the obligation of thinking about a lion's share of the populace. It very well may be contended that a country of a billion people has been denied of a better than average EMS for a really long time now and the opportunity has already come and gone the government makes authoritative move and frame policy changes in providing emergency care in hospitals. Hospitals are pretty well doing out of the capacity to serve the patients, but with the growing infection rates and numbers is it sufficient?

Conclusion:

The Indian healthcare framework needs rebooting whatever the situation entails in the future. Indian healthcare set up wasn't ready for such a gigantic Pandemic. Even faced with these rising challenges, the Government, Health ministry, states are working in close cooperation to handle this global disaster. As per the reports put forward by the **WHO, 1 in 10 patients can get other infections while receiving care.**(WHO). Since we are to face this covid pandemic for the coming future, re-engineering is going to be a must for healthcare institutions in India. The points put forward in the discussion above are to be considered by all healthcare institutions, if they hope to see themselves survive in the long haul.

Clinics have and should develop new modalities to treat patients with NON-COVID symptoms. As elective services can be deferred, and not avoided. Perilous deferral of crisis and necessary methodology is accepted to cause difficult issues later and prolong hospitalsation and care. Proactive patient administration is a definitive objective. Outpatient department is first line of contact which truly shows the viability of Hospitals and all emergency hospitals ought to embrace, develop to fit in the race against COVID-19.The changes that can be made in future is total redesigning of hospitals right from infrastructure point of view like modular designs. These designs will allow us to change in case of alterations. One such example is mobile hospital and isolation facilities can be a hitting a notch up providing essential medical care and nursing facility. Healthcare system especially Hospitals have realized the importance of Disaster management protocols and even infection control. So yes long way ahead but hospitals are keeping no stone unturned to reach there. Lot of needs to be done from side of government, policy makers, but yes private tertiary care hospitals have realized that importance of surge capacity, the disaster control protocol and importance of infection. This epidemic proved and is

proving the eye opener for Indian public health system and the reforms it needs to achieve to be self-reliant.

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