Planning Of Hospital Building and Reducing Accidents in Hospital

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Abstract: - We studied from several hospitals indicates challenges according to usability of hospital buildings, with the rapid and continuous changes in the hospital organization and use of technology. The quality of hospital buildings depends on the buildings ability to absorb organizational, operational and technical changes. Usability defined as the "….effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment.: Effectiveness – whether users can achieve what they want to do with the product Efficiency – how long it takes them to achieve it Satisfaction – their feelings and attitude towards the product Hospital buildings are characterized by major complexity, and hospital operation are affected by rapid changes and trends. Planning and design of hospital buildings reflect a view of society, humanity and patients at all levels, from the location, overall concept and urban plan, down to the architecture and design in the immediate surroundings of the patients and staff.

Key Words: —*Hospital, Accidents, Planning, Building.*

I. INTRODUCTION

Building construction in the engineering deals with the construction of building of public buildings, residential buildings and commercial buildings. In a simple building can be define as an enclose space by walls with roof, food, cloth and the basic need of human beings building is a manmade structure of roof and walls. Buildings can be of various size, shape.. A Multi-Storied is a building that has more than one floor in the building. The design process of multi-stored building not only requires imagination and concepts but also with good knowledge structural engineering and also knowledge of practical aspects, such as recent des ign codes, bye laws, modern methods of constructions of building . A hospital building are one among the complex building type. It contains more range of services with various functional units.

II. LITERATURE SURVEY

A. Objective

This present literature review explores current issues and Research inconsistencies regarding the Design of hospital circulation zones and the associated health-related outcomes. Background.

B. Future Scope

A systematic literature review is conducted based upon combinations of key words developed vis-à-vis a literature search in 11 major databases in the realm of the health sciences and the planning and design of built environments.

Fig.1. Health Monitoring systems

C. Results

Eleven peer-reviewed articles were included in the analysis. Six research themes were identified according to associated health-related outcomes, including way finding difficulties and spatial disorientation, communication and socialization patterns,

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measures and control of excessive noise, patient fall incidents, and occupants' stress and satisfaction levels.

Components of any healthcare delivery system, hospital circulation zones are tended to remain neglected. Several knowledge gap as well as communication in patients are identified.

Fig.2. Patient care

III. CASE STUDY ON OXYGEN LEAK ACCIDENT IN NASHIK

24 die after oxygen tank leak in Nashik hospital. State health minister Rajesh Tope said the leak was on account of a fault in the tank's valves that caused the prescribed oxygen pressure to reduce, leading to oxygen deprivation.

Twenty-two Covid-19 patients – 11 men and 11 women – died of oxygen deprivation in Nashik in north Maharashtra on Wednesday after an oxygen tank leak led to a malfunctioning of ventilators and oxygen support equipment at Dr Zakir Hussain Hospital. Two more patients died later in the evening, taking the toll in the incident to 24.

State health minister Rajesh Tope said the leak was on account of a fault in the tank's valves that caused the prescribed oxygen pressure to reduce, leading to oxygen deprivation. The hospital, a civic-run entity, was treating 157 Covid patients, of which 131 were on oxygen support and 15 were on ventilators. Though the hospital's capacity is 150, Nashik's medical infrastructure has been overwhelmed by the second wave of Covid-19. On April 20 alone, the district reported nearly 4,000 Covid-19 cases and 48 deaths. Its overall caseload stood at 248,991 with 2,478 fatalities. The district's active caseload on April 20 was 42,242.

"The coronavirus crisis has plunged the country into a vicious cycle of misfortune," said chief minister Uddhav Thackeray.

"There is a shortage of oxygen, medicine, and beds at various places, and people are dying. In all of this, the news of the accident that led to the death of 22 patients is shocking and heart breaking. I have no words to express my grief."

He added: "How can we comfort the relatives of the deceased? How can we wipe their tears? This may be an accident, but the grief of the relatives of the deceased is immense."

Later in the evening, two more patients died. "The death toll in Nashik tragedy rose to 24 by evening after two more persons on ventilator succumbed. These two could not get sufficient oxygen earlier in the day as a result of which their condition deteriorated," said Nashik district collector Suraj Mandhare .

Thackeray also announced an investigation into the incident and a ₹5 lakh ex-gratia payment to the families of each of the deceased. "This unfortunate incident must not be politicised," he said. "This has traumatised the whole of Maharashtra. We will fix responsibility, and no one will be spared."

Meanwhile, Tope visited Nashik in the evening and said a seven-member committee comprising experts from various fields will probe the incident.

"Nashik divisional commissioner Radhakrishna Game will chair the committee. It will also have deputy director from state health department Dr PN Gandal, Nashik-based intensivist PramodGunjal, principal of the Nashik Government Polytechnic DnyandeoNathe, Nashik Municipal Corporation additional engineer Sandeep Nalawade, Joint Director of FDA MadhuriPawar and HarshalPatil, an expert involved in installing oxygen plants," Tope said.

As news of the oxygen tank leak spread, angry relatives of patients and others barged into the hospital, leading to chaos, officials said. According to senior civic officials, for the first few minutes, the health care staff was trying to deal with family members as well as trying to restore the oxygen supply. "The entire hospital staff is in shock," said Nashik divisional commissioner Radhakrishna Game.

According to Dr Vijay M Natarajan, CEO, Symbiosis University Hospital & Research Centre in Pune: "The moment oxygen pressure starts going down, an inbuilt alarm goes off in the ventilator. The alarm system is about low FiO2 (Fraction of Inspired Oxygen). In hospitals such as this, there are jumbo cylinders that supply oxygen through a channel known as central oxygen with a socket inserted at the intensive care unit level."

He added that the oxygen pressure is "standard to all ventilators and is not patient dependent".

Game said the incident was reported around 10am on Wednesday, when the oxygen tank's socket malfunctioned. "Hospital authorities shifted some patients, though 22 people lost their lives as oxygen pressure was reduced. After the incident, relatives and others started entering the ward, leading to chaos. This led to a delay in restoring the situation."

Prime Minister Narendra Modi said. "The tragedy at a hospital in Nashik because of oxygen tank leakage is heart-wrenching," he tweeted. "Anguished by the loss of lives due to it. To the bereaved families in this sad hour."

Civic officials said the accident occurred when the hospital's oxygen tank was being refilled by a private agency. "The private agency's executives noticed the leakage. Technicians were immediately called and the problem was fixed," said Game.

Angry relatives, however, alleged that the hospital did not inform them immediately about the incident. "It was only after we barged inside that I got to know my brother is no more," a deceased patient's relative said. The local administration beefed up security at the hospital to prevent any untoward incident as relatives of those who lost their lives in the tragedy kept demanding immediate action against those responsible.

Case study on Virar fire in hospital

At least 13 patients have so far been killed in a fire that broke out at Vijay Vallabh Covid care hospital in Virar of Palghar districts early on Friday .The fire started at around 3.15 am and was doused within an hour.

The fire was extinguished around 5.50 am.

An employee of the private hospital in Maharashtra's Palghar district, where 13 Covid-19 patients died in a fire after a blast in an air conditioning unit, said the AC system there was not working since Thursday afternoon and some repair work was goingon.

The fire broke out in the intensive care unit on the second floor of the four-storeyed Vijay Vallabh Hospital at Virar in the early hours of Friday, in which five women and eight men died.

When I went to the hospital yesterday afternoon, the air conditioner was not working in the Covid-19 ward of the hospital.

I saw that some repair work was going on at that time as AC panels were removed, "Supriya Deshmukh, a staffer at the hospital. Meanwhile, the hospital set up some fans as a temporary arrangement.

After finishing my work and I returned home late in the evening" She said.

Meanwhile, the relatives of the Covid-19 patients who died in the incident, complained about the hospital's alleged mismanagement to Shiv Sena leader and state minister Eknath Shinde, when he went to take stock of the situation.

The relatives told him that the hospital was understaffed, due to which proper attention was given to the patients. The incident comes a month after at least ten patients died in

Maharashtra is continuing to see an alarming upsurge in Covid-19 cases. The state reported 67,013 new infections on Thursday, taking its case tally to 40, 94, 840.

IV. MEDICAL DEPARTMENTS AND FACILITIES

A. Departments

We Are Providing Following Medical Departments in Our Hospital

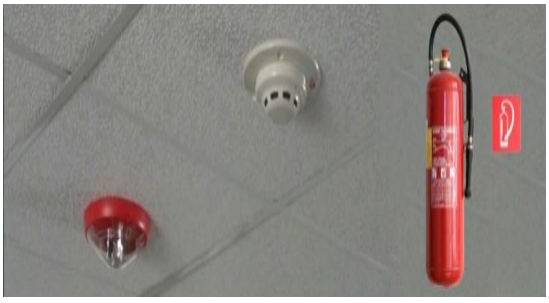
- Cancer.
- Heart And Cardiology
- Neurology
- Orthopaedic And Physiotherapy
- Ent
- Eye

B. Facilities

We are providing following facilities in our hospital

- Reception
- Account Department
- Casualty
- Common Utility Area
- Common Washroom
- Waiting Room
- Waiting Room
- Drinking Area
- General Ward
- Special Room+ Washroom
- Deluxe Room +Washroom
- Suits
- ICU
- NICU
- Recovery Room
- Minor OT
- Major OT
- Radiology
- Pathology
- Doctors Cabin
- Ample Parking
- Pantry
- Housekeeping
- Staff Room
- Doctors Rest Room
- Consulting Room For Visiting Doctors
- Residential Rooms For Doctors Or Staff
- Nursing Station
- Starchier Lifts
- Passenger Lift
- Fire Exit
- Fire Fighting Station
- Oxygen Plant
- Canteen
- Medical
- Ambulance
- Hygiene
- Lawn
- Transportation And Communication
- Banking Facilities Like ATM
- Laboratory

Fire Fighting System:



- Evaluate the location of the Fire pump house and water storage tank to meet the Statute and standard requirements and the availability of nearby hazards.
- Adequacy of the underground and above ground fire water tank and pumping capacity, Availability of Overhead tank and its interconnection with Fire water network, and backup supply.
- Checking the Adequacy of the sprinkler system, detection system, operating temperature / other parameter.

Fire Detection and Alarm System:

- Adequacy of the Fire detection and alarm (FDA) system with respect to relevant standards, positioning of the detectors with respect to ventilation system, beam depth, obstructions, etc.
- Checking the availability and adequacy of the backup power supply to FDA panel and other electrically operated emergency equipment's

Gas Suppression System:

- Assess the requirement of Gas suppression system based on fire risk and criticality of the equipment's / operations as per relevant standards.
- Assessing the location of the Gas suppression cylinders, routing of pipeline, location of manual release and abort switches and panel, Standby power supply, etc.

Passive Fire Protection:

- Segregation of the facilities and utilities, requirement of fire partition walls and its fire rating
- Segregation of power cables and data cables and utilities lines
- Addressing the fire spread through vertical and horizontal openings meant for cable passes, utility lines, etc.

Emergency Management & Life Safety System:

- Availability of Emergency preparedness plan
- Adequacy of emergency exit based on occupant load / type of occupancy / type of exit
- Adequacy and availability of emergency lights and ventilation
- Segregation of the emergency exit from the remaining facility.

C. Four Keys to Avoided Fire Accidents in Hospital

- Identify the fire hazards in the hospital the first step of conducting a fire safety audit is to identify the potential causes of a fire or explosion at a place. In case of hospital, it can mainly due to electrical short-circuits, bursting of gas cylinders at the kitchen, unattended cooking, malfunctioning of heating equipment, unauthorized smoking inside the premises etc. Also, the people who are at risk needs to be identified.
- Determine the adequacy and efficiency of fire-alarm systems Next, the availability and adequacy of fire-alarm systems need to be determined. A drill should be conducted to evaluate whether the installed systems are able to correctly determine the smoke and create an alarm to warn the occupants inside the hospital. Also, the availability of suitable fire-fighting facilities, emergency escape routes, and the training of staff to fight with fire, in case the need arises, needs to be evaluated.
- *Create an audit report based on the findings:* After the audit, the team members need to compile their findings into an audit report. It should include the details of audited areas, the potential chances and hazards of a fire accident, availability and efficiency of fire-fighting techniques etc.
- *Suggest the recommendations:* The final step of conducting a fire safety audit involves the publishing of the audit report and listing down the recommendations, if any, along with the areas that need improvement. The audit report should also be able to tell how safe or equipped the premises are in case a fire breaks out. Conducting fire safety audits may take some time and efforts, but they can provide worthwhile

D. How to Reduce Oxygen Accident Cases

Oxygen is the most commonly used drug in emergency medicine and when used judiciously in the treatment of hypoxemia it undoubtedly saves life. However, oxygen is often

used inappropriately and the dangers of over-oxygenation are unappreciated.

E. Risk in Oxygen Cylinder

The air that surrounds us and sustains our life contains about 21% oxygen, and even very increases to oxygen levels in the air can create an atmosphere where fires start much easier, burn much hotter and are almost impossible to extinguish. This situation is known as oxygen enrichment

F. Maintenance of Oxygen Apparatus

We need Good housekeeping practices are necessary this is particularly true with combustibles such as grease, lubricating oil, asphalt, etc. The importance of cleanliness cannot be overstressed. Never permit oil, grease, or other combustibles to come in contact with any part of the aircraft's oxygen system or the charging equipment. Do not handle oxygen equipment with oily hands, gloves, cloths, or tools do not perform in work wearing oily or greasy clothing. Keep protective caps on equipment in position gas long as possible and replace as soon as possible. We should Use only lubricating and thread compounds specifically approved for oxygen service under the pressures and temperature involves. Do not use oil or grease.

G. Maintenance of Oxygen Unit

Maintenance begins with inspection: Inspecting an emergency oxygen unit is not difficult, but a few specific features need to be checked regularly for both your safety and the functionality of the unit. Thoroughly inspect your unit at least once a month and after every use. Make sure the cylinder is not just full, but full of oxygen, and that the oxygen washer is free of cracks, dirt, grease and oil. Perform a thorough inspection for leaks and signs of wear or damage, and make sure the unit is complete. Emergencies are stressful, and pieces of equipment commonly go missing after oxygen unit deployment. After each use, wipe down the cylinder, regulator and hoses, refill the cylinder, and replace any single-use items such as one-way valves, nonrebreather masks and bag valve masks. Keep a maintenance schedule.

Oxygen units are very similar to scuba units.

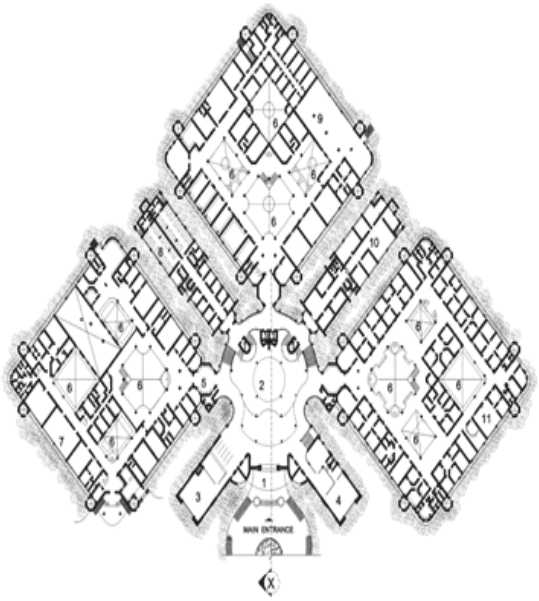


Fig.3. Architectural Plan

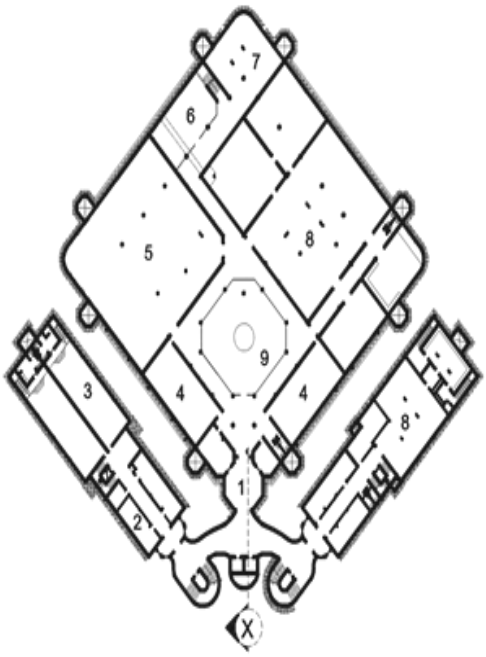
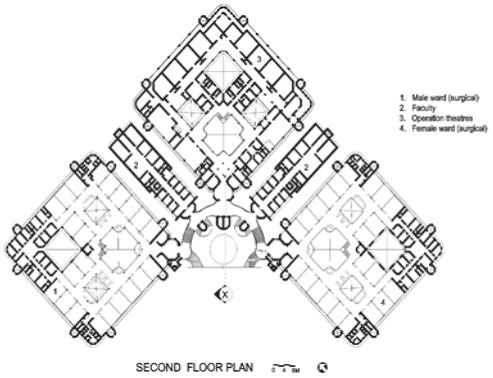


Fig.4. Ground Floor Plan



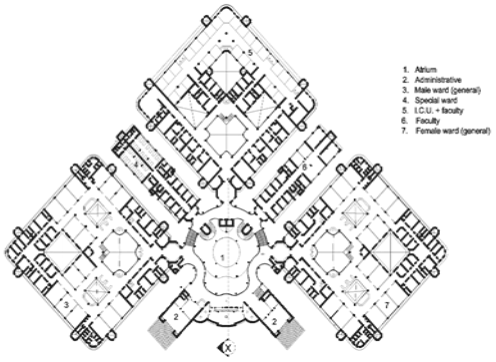
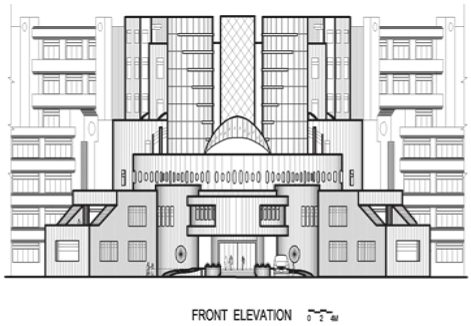


Fig.5. Basement Floor Plan



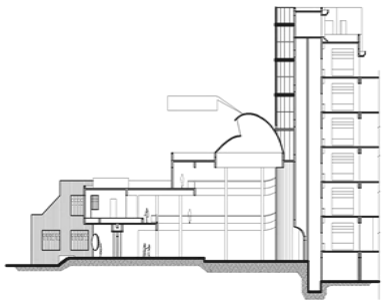


Fig.6. First Floor Plan

V. FUTURE SCOPE

Hospitals and healthcare centers have undergone a change for its betterment. Have a look at some salient features of hospital management software.

This tool is a comprehensive solution that integrates all the departments by creating a common platform. In brief, hospital management system has all the modules that serve purpose of all the departments of healthcare institute. In fact, these modules have been competitively designed to make all the operations simplified.

VI. CONCLUSION

- The hospital plan was drawn by Auto-Cad 2013.
- Planning was properly done on the basis of hospital survey.
- The estimation part of project was helped us how we should do estimation of given drawing and planning.
- The design hospital project was helped us to acquired knowledge about various design and planning pts.
- We learn how to do case study.
- The case study of Nashik oxygen leakage and fire at vijay vallabh hospital in Mumbai helped us to get knowledge about how to do designing and planning of hospital safety and awareness about hospital emergency facilities.
- We learn how to do team work on any kind of building construction project.

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