Hospital Fire Safety Management: Review on Planning and Safety Measures

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Abstract: ***Safety management is a very important aspect of planning in every form of infrastructure. Safety management as a whole include aspects of not only fire safety, but also security measures in terms of safety from other unsafe encounters like thefts, pilferages, extortion, riots, natural calamities, etc. Safety measures should be so designed to ensure safety of all services renderers, service recipients, infrastructure (property, other fixed assets), etc. However lets focus on one major aspect of safety management & i.e. Fire safety. Fire can cause irreparable losses, particularly to any hospital. Hospitals are infrastructures with a high density of life in terms of patients, doctors, staff, etc. Therefore utmost care needs to be taken and precautions followed to imbibe good safety measures & practices amongst planners, employees & healthcare workers in any hospital. The hospital as an infrastructure has many heat dissipating equipments, combustible gasses /fuel, chemicals, a lot of electrical wiring, etc. that stand as prone to hazardous incidents, if proper precautions not taken while planning the infrastructure. Adequate measures need to be considered, designed and practiced to ensure safety to all. Indicators like architectural designs, interior designs, electrical wiring, appropriate equipment planning and proper waste management are considered while planning such safety measures.***

Keywords: ***hospital, fire safety, planning, design & safety measures.***

I. INDTRODUCTION:

Fire safety & protection is matter of vital importance concerning everyone in the hospital industry. After the grief-stricken incidence of Kolkata question of safety of patients have raised in India. Unawareness of safety measures specially among staff of hospital led to death toll of more than 90 persons including patients as well as staff. Whole incidence turned out as an eye opener for government as well as health care provider. For fire safety and protection in hospital an intelligent building design is needed to cater to various potential emergency situations to avoid further incidence of same kind. The main objective of fire safety design of buildings should be assurance of life safety, property protection and continuity of operations or functioning. The designer must recognize the type of danger posed by each component and incorporate effective counter-measures in hospital. Fire Protection Engineering has made substantial strides in its professional development and all should be implemented.
Many old hospitals, mostly government hospitals, do not have fire safety equipments like sprinklers. Even the roads inside big hospitals, which should be 6 metres wide, are blocked with parked vehicles. If a fire breaks out, the fire tenders cannot even enter.

Therefore norms & codes for building design & fire safety should be followed not only for high rise hospital buildings but also for small set up or nursing homes properly. Fire Codes process is a complex process which integrates many skills, products and techniques into its system. It has been observed that a big hurdle in the way of efficient fire safety measures is the blocked staircase area in most private hospitals across India. The staircase is usually blocked by locked glass doors, meant to restrict the entry of patient's relatives or other unwanted people; instead of giving priority to safety. This could be resolved by keeping security guard to keep outsider at bay and leaving the staircase open for emergencies.

II. ARCHITECT & LAYOUT PLANNER:

While planning the layout, care should be taken to design the building such that there is sufficient open space around the building to minimize fire spread possibilities from or to neighboring structures. Also there should be enough space for movement and parking of fire fighting vehicles, ambulances, etc in the premises.
The design & construction of every building structure should incorporate features of prevention of fire & fire loss:
Considering the type & density of occupancy, lobbies, staircases, aisles, etc should be sufficiently wide to ensure easy movement of traffic at all times and at the same time to permit easy and orderly evacuation during emergencies.

- The design of the building structure should be so planned that it allows pressurized exclusion of smoke in case of fire or any smoke leak.
- Adequate emergency rescue aids and suitable refuge area should be incorporated in the design. The critical areas should be well protected with such measures and extra precautionary measures should be implemented in such critical areas, for e.g.: use of fireproof doors.
- Ideally a heavy-duty elevator especially for use of fire fighting personnel only & used in case of emergency only should be incorporated.

In addition to the above the planner also needs to incorporate the following:

- The building should be so designed that it can resist damages due to earthquakes to a fair extent.
- Safe & easy means of access should be provided to and in every place of work /occupancy. This should enable access to all including the disabled to move easily.
- In case of an emergency safe and rapid egress should be provided for all occupants.

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- The floor should be so designed that they are free from obstructions, slip-resistant & even. Openings in floors should be securely fenced or covered
- Staircases, ramps & aisles should be provided with substantial handrails and other suitable support means to prevent slipping, wherever necessary.
- Easy access for the servicing and maintenance of plant, machinery and buildings should also be incorporated in a design.
- The "National Building Code of India, 1980 issued by the Indian Standards Institution serves as an excellent references to safety management for infrastructures.
- The Tariff Advisory Committee Of the General Insurance Industry &The Metropolitan City Government Authorities recognize fire hazards with large buildings and have developed rules and regulations for fire protection & fire fighting requirements in large buildings.
- Architects, layout planners, interior designers & construction authorities need to follow these rules and regulations diligently.

III. INTERIOR DESIGNER & ELECTRICAL AND ENGINEERING (PLANT & MACHINERY) PLANNER:

The interior designer needs to keep in mind to incorporate the environment safety measures, the clean green ambience & comfort levels for the occupants of the infrastructure especially the patients here. Indicators like adequate natural light, fresh air and color therapy need to be considered in such designs. The designs should be such that there is minimal use of combustible materials. The designs should use plenty of good quality fire retardant material for furnishing & decoration purposes. Appropriate waste management systems also need to be designed to prevent accidents due to hazardous waste.

- For electrical wiring designs and plant & machinery designs:
- The electrical wiring could be enclosed in metal/ heavy gauge screwed conduits.
- The cable passing from one floor to the other should be suggestively sealed off effectively to minimize fire-spread possibilities.
- A master control switch for each floor should be located at the ground floor for easy switching off of systems in case of emergency.
- It is highly advisable to use individual air conditioning or space heating systems for each floor in large buildings. However in case of centralized systems that we generally use in hospital infrastructures; care should be taken to provide appropriate automatic fire dampers for each
- floor in the common ducting system.
- Proper cooling facilities to dissipate heat should be provided for over heated equipments/ plants/ machinery.
- Boilers, Plant rooms, Freezers, manholes and similar confined spaces should have effective means to ensure safe access & exits.
- All equipments should be bonded and earthed properly to dissipate the static charges to the earth.
- Incorporate totally enclosed switchgear systems/ miniature circuit breakers instead of ordinary fuses.
- Always an emergency power supply arrangements need to be designed & incorporated in case of total system switch-offs during emergency.
- Appropriate fire fighting equipments, fire detection, smoke & heat detection alarms should be incorporated in the design.
- The fire fighting equipments should be planned as per quality standards & norms.

Safety Practices:

- Finally after taking adequate precautionary measures in the conceptual & design stage itself there is a need to implement safety measures & protocols in the infrastructure:
- Prepare a guideline manual to be followed by all the staff for prevention & precautions against fire & related accidents.
- A manual stating actions/steps to be taken in case of emergencies should be effectively designed and followed stringently by all.
- The staff should be trained to handle such emergencies & chaotic situations.
- The organization should call for regular safety audits & drills so as to train the staff effectively.
- The fire audit survey should be conducted as per standard norms and the changes if any should be implemented diligently.
- Appropriate delegations of tasks should be implemented for safety management protocols.
- Preferably a head/supervisor should be designated to look into the safety measures of any infrastructure.

The above stated indicators & guidelines are only some of the vital tools & protocols considered for fire safety management. There are many more protective measures & safety norms to be implemented & practiced for proper safety management. For e.g.: Implementation of electrical wiring as per ISI standards, etc.

To conclude, safety for all is a responsibility of all. It is not only the staff of the hospital but also the occupants. However it becomes more important for the healthcare service renderers to follow all precautionary measures for effective safety management of self & the infrastructure, especially the patients. We have come across so many instances where in there have been casualties in terms of injuries & loss of life of patients in a hospital in the advent of fire & inadequate measures taken thereof or as a result of untimely help. Hence it is of high importance that the staff is well trained and equipped with knowledge & preliminary equipments to handle such calamities. Further it becomes necessary for every planner to take all the precautions & consider all safety management protocols and incorporate them in the design of the infrastructure especially for an hospital infrastructure; where care, safety & well being of mankind is of utmost importance.

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Important Fire Safety Measures in the Hospitals:

Fire safety is an important norm that needs to be considered during the construction of a hospital. Compared to the general buildings, it is a tough task to evacuate the people from the hospitals. It is unfortunate there are still a few hospitals in which the fire safety is still the words written on the water surface.

The hospital training and learning arm to blame that most of the hospital staff do not have awareness of fire safety and the steps that need to be employed in the face of calamity. And, the highly dependent and immovable patients make it a difficult task to evacuate the hospital building in a rush.

Hospitals and other healthcare facilities need to focus more on the easy and safe evacuation methods. The healthcare practices are responsible for the safety and security of the people inside the hospital and they are expected to adhere to the legally approved fire safety measures.

The Emergency Management Plan (EMP) should be kept current so that it stands the unexpected occurrence of a fire in a hospital. Here are a few fire safety measures of a hospital that are proven to be effective.

- A Detailed Action Plan – The fire accidents leave no room for thinking. With a detailed action plan that has answers to all questions and needs will save time for thinking and help you to react instantly in the right way. Involve all the departments of the hospital in the brief of this action plan.
- Establish the Incident Command Structure – Communication has vital importance in reducing the damage caused by a fire accident. Establish a functional incident command structure that has groups and subgroups. These groups and subgroups form a tree of communication and follow the instruction of the group leader.
- Instructions for a Fire Safety Management Team – Involving the Fire Safety Management team in the hospital planning and opening the gates of communication with this team well advance will reduce the damage caused by the fire accident. Keep the communication loop always open with the Fire Safety Management team will keep the damage to a minimum.
- Fire Safety Evacuation Aids – Hospital evacuation is a challenging task and the fire safety evacuation aids will help you in this regard. There are many types of evacuation aids available in today's market. Equip your hospital with evacuation mats and sheet that could hold the patient firmly while sliding to a safer location.
- Fire Fighting Equipment in Check – The firefighting equipment that includes smoke detectors, fire alarms, emergency exit signals, fire extinguishers and other fire fighting equipment should always be in check. Conduct a performance check while doing the fire drills to ensure the responsive in the face of a danger.
- Mock Drills and Fire Safety Training – This aspect has vital importance in reducing the damage and saving lives during a fire accident. Ensure all your staff members are undergoing the fire safety training programs and participating in the mock drills. This not only creates a responsive and reliable team in case of a fire but also establishes a safe and secured atmosphere that prevents fire accidents.

An ounce of prevention is worth a pound of cure! List down the hazards that could lead to fire accidents and keep the system aware of the fire hazards and their preventive methods.

With all the oxygen cylinders and electronic equipment, hospitals always carry a high-risk badge for fire accidents. Ensure your whole system is involved in fire prevention by taking measures of fire prevention, ensuring the fire safety equipment is intact and functional, staff who have undergone the fire safety training and are reliable during an emergency.

IV. GENERAL RECOMMENDATIONS:

1. Hospitals of high rise buildings are found to be utilising the cellars for generators and transformers, which is strictly prohibited.
2. Canteens, OP blocks, dormitories and pathological labs are not allowed in cellars.
3. Regular refresher training courses for the fire brigade personnel.
4. Recommendation for creating Rural Fire Services in areas which are not at present under any full time Fire Service cover.
5. Augmentation of Municipal Hydrant System.
6. Adoption of best practices from other city codes like Mumbai Delhi and Hyderabad by State Government for fire safety.
7. Clarifying position of CFO and Fire Protection Consultant in approval procedures.
8. Recommendation for establishment of Disaster Control Room for cities.
9. A passing reference to NBC rules like provision of fire doors, fire separating walls, fire exit & fire lifts should not be overlooked.

V. IMPORTANT FIRES SAFETY MEASURES

Fire safety Measures have 4 Parameters namely means of access through approach roads, open spaces, means of escapes like external Staircases & Fire fighting equipment. Thus provision of all these is necessary from safety point of view within hospital premises. An effective fire program calls for an understanding of the hospital fire plan & the active participation of every employee at all times. Also at least 1 well trained fire officer should be elected at every hospital. There is no better protection against fire than constant vigil to detect fire hazards, prompt action to eliminate in safe conditions & a high degree of preparedness to fight fire. Everyone should remember that every big fire starts from small one therefore nothing should be considered insignificant within hospital premises.

Some hospitals lack trained staff to handle such emergencies therefore frequent mock as well as evacuation drills must be taken.

Panic & confusion are the greatest hazards of fire & they can be countered only by sufficient preparedness which should be avoided by means of hospital staff in case of fire emergency. Strong actions like putting board of 'Fire Unsafe Building' in front of hospitals, which did not initiate fire safety measures like Fire Department (Hyderabad) should be implemented in other cities & states. The best form of protection from fire is its prevention.

VI. CONCLUSION:

Fires can be devastating, especially in a hospital where a large number of people who need to be evacuated may be vulnerable – immuno compromised, on life support, and incapable of moving on their own. There are special requirements that must be met with while evacuating such people in case of fire emergencies. But before that – "fires must be prevented". Most fire-related hazards are caused due to carelessness and improper handling of goods. One of the places where it is difficult to evacuate people in case of a fire breakout is a hospital. Evacuating people from hospitals during a fire hazard is challenging because it involves moving patients who are immobile and are unable to help themselves. The real challenge is evacuating high dependency people before the fire spreads in the vicinity. Therefore, it is important that hospitals and other health care centers have adequate fire prevention and safety measures in place. Prevention is the key in the case of fire-related accidents especially when places like hospitals are concerned. Every hospital must have well-planned exit ways and well-maintained firefighting equipment to ward off the casualties and damage to assets. By ensuring fire safety in hospitals, we can prevent fire accidents. Hospitals stack a lot of combustible materials like chemicals, cylinders, surgical equipment, etc. And many hospitals also have an inbuilt kitchen or canteen. A fire accident may have a lot of casualties as the fire may become uncontrollable in minutes. So, the hospital management should ensure that their buildings are fire safe all the times.

REFERENCES:

1. National Disaster Management Guidelines (Draft): Hospital Safety. National Disaster Management Authority. Govern-ment of India Document; 2013.Availablefrom:www.ndma.gov.in/images/pdf/NDMAhospitalsafety.pdf.
2. Talati S, Bhatia P, Kumar A, Gupta AK, Ojha D. Strategic planning and designing of a hospital disaster manual in a tertiary care, teaching, research and referral institute in India. World J Emerg Med 2014;5(1):35-41.
3. Murphy GR, Foot C. ICU fire evacuation preparedness in London: a cross-sectional study. Br J Anesth 2011 May;106(5):695-698.
4. Disaster Preparedness Training Programme. Introduction to Disaster preparedness International Federation of Red Cross and Red Crescent Societies; 2000 Jun . Available from: http://www.ifrc.org/Global/Introdp.pdf.
5. Williams J, Nocera M, Casteel C. The effectiveness of disaster training for health care workers: a systematic review. Ann Emerg Med 2008 Sep;52(3):211-222.
6. World Health Organization. Hospital emergency response checklist. An all-hazards tool for hospital administrators and emergency managers. WHO Regional Office for Europe; 2011 . Available from: http://www.euro.who.int/__data/assets/pdf_file/0020/148214/e95978.pdf?ua=1.

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