



Hospital Administration

EVALUATION OF FIRE SAFETY COMPLIANCE & EVACUATION PLAN IN A TERTIARY CARE MEDICAL INSTITUTE OF NATIONAL IMPORTANCE IN INDIA

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ABSTRACT As hospitals in India are becoming bigger and higher by the day, the importance of fire prevention & safety is becoming paramount. However, it is often seen that the compliance to statutory guidelines of fire safety remain on paper only. In this study a fire safety checklist was compiled and the compliance of a tertiary care public hospital of national importance was evaluated. Many non-compliances similar to those identified in other hospitals where fire accidents had occurred in the past were also seen in this hospital. The study explores how most hospitals neglect the same common parameters which makes them vulnerable to fire accidents. The study recommends steps for implementation of a fire safety programme in a hospital.

KEYWORDS : Fire Safety, Hospital Fire, Disaster Management

INTRODUCTION

“Hospitals Don't Burn” this is the caption given to the Hospital Fire Prevention and Evacuation Guide published by PAHO and WHO. The document has rightly caught the attitude towards fire safety in hospitals. It has always been felt that fires can never happen in a hospital. However, with hospitals becoming bigger and higher by the day and with the inclusion of more and more sophisticated technology in hospital infrastructure, hospitals have now become extremely vulnerable to fire incidents. Hospital fire dangers are real, widespread, and ever present (1). Ensuring fire safety inside the modern high-rise hospitals of today has become a challenge not only for designers but also for operators. Because high-rise hospitals tend to have more patients and a longer distance to the exit, fire prevention and fire risk assessment for the building are essential. (2). Fire Safety is of paramount importance in hospitals because patients especially the elderly, post-operative or the ICU patients are highly dependent on members of staff for their mobility. (3) In an emergency evacuation situation in a hospital, many patients will not be able to walk independently out of the hospital.

Hospital Fires also come with a tremendous loss to life and property. During the five-year period of 2011-2015, United States fire departments responded to an estimated average of five thousand seven hundred and fifty structure fires in health care facilities per year. These fires caused an annual average of two civilian deaths, one hundred fifty-seven civilian fire injuries, and more than fifty million dollars in direct property damage. (4). In India a total of thirty-three fire incidents were reported online by mainstream media sources in the past 10 years. A total of one hundred thirty-one fatalities have occurred in 8 of these incidents. Twenty-five incidents were reported to have occurred in government owned establishments, 7 in private hospitals and 1 in a trust hospital. (5). A list of important fire incidents in hospitals in India are shown in Table 1.

Table 1: Hospital Fires in India

	Hospital	Year	Casualties
1	AMRI Hospital Kolkata (6)	2011	95
2	PBM Hospital, Bikaner (6)	2013	-
3	Rajendra Hospital, Patiala (6)	2013	5
4	Guru Teg Bahadur Hospital, Delhi (6)	2013	-
5	Galaxy Care Hospital, Pune (7)	2013	-
6	Safdarjung Hospital, Delhi (8)	2016	-
7	Sishu Bhawan Hospital, Cuttack (9)	2015	-
8	SUM Hospital Bhubaneswar (10)	2016	22
9	Murshirabad Medical College Hospital, West Bengal (6)	2016	3
10	ESIC Hospital, Mumbai (11)	2018	6
11	Shine Children's Hospital, Hyderabad (12)	2019	1

12	AIIMS New Delhi (13)	2019	-
13	Jai Prakash Narayan Apex Trauma Centre, New Delhi (14)	2019	-
14	District Hospital, Bhandara, Maharashtra (15)	2021	10
15	Sun Hospital. Cuttack (16)	2021	-

The fire at AMRI Hospital, Kolkata in December 2011 was the landmark incident which changed the entire scenario regarding fire safety in the healthcare industry of India. In this incident about ninety-five people, including three hospital staff, were killed. In consequent to the AMRI hospital fire incident, Government of West Bengal brought in the modified “West Bengal Clinical Establishment Rules, 2012”. Fire safety audit of several major hospitals in Delhi and Mumbai revealed that more than fifty percent of the hospitals lack fire prevention measures. The incident brought to light that Fire departments across the country were in desperate need of modernization. (17)

The objective of this study is to evaluate the compliance of a high-rise apex tertiary care public hospital to prevailing fire safety practices in the country and understand the evacuation procedures planned in case of a major fire incident.

METHODOLOGY

A checklist for fire safety was compiled taking reference from prevailing laws and local by-laws, Quality Standards like NABH, recommendations from international bodies like WHO, and other relevant literature available on the internet. This checklist was discussed with the Hospital Fire Safety Committee and suitably modified. Based on this checklist an internal audit of the existing fire safety measures was done and deficiencies if any were identified.

RESULTS & OBSERVATIONS

During the internal inspection the hospital was found compliant with most of the requirements for Fire Safety with regard the infrastructure and legal documentation. Majority of the medical and non-medical personnel were aware about the importance of fire safety. The hospital had a Fire Safety Committee headed by a senior doctor administrator and had representatives from all stakeholders. This committee is responsible to ensure compliance to hospital wide fire safety practices. The observation noted during this study are mentioned below.

a) Electrical Safety & HVAC:

Electrical fixtures like switch boards, plug sockets were found to be broken and not repaired in many places in the building. These are potential sources of short circuit. The electrical distribution rooms have water seepage most likely due to rain water. There was no preventive inspection with thermal guns to detect potential overheating of electrical wires which can lead to electrical short-

circuiting. The AHU rooms were not secured and were open to public spaces. This increases the potential of unauthorized access and potential risks of malfunction etc. The use of extension board for plugging medical devices was rampant. This again was a common source of electrical sparking and also reflected poor planning.

b) Storage of Hazardous/Flammable Materials: Many combustible items were found in the basement parking. Similarly, there was no stringent policy for storage spaces and items were found stacked as per convenience inside the hospital areas even though they may be posing as a fire hazard or blocking the fire escape routes.

c) Fire Safety Signages & Emergency Lighting System: The hospital had installed fire exit signages but fire escape routes were not displayed in the building. Fire extinguishers were placed at strategic location but there were no signage instructing how to operate the fire extinguisher. Emergency lighting system was not seen in the patient care areas or corridors.

d) Fire Safety Manual: The Fire Safety committee had the responsibility to develop a Fire Safety Manual however no such document was maintained by the organization.

e) Fire Detection & Alarm systems: During commissioning the hospital had installed a robust labyrinth of fire detectors however over the course of time they had not been maintained. The fire alarm panels that had been installed in the fire control room also lacked periodic preventive maintenance and no records of the same were available.

f) Fire Fighting Equipment: The hospital did not have latest firefighting equipment and those that were available were not in adequate numbers considering the size of the hospital

g) Fire Fighting Team, Training & Mock Drills: The fire safety team comprised of only four personnel and they were deployed in shifts. This was a grossly inadequate considering the size of the hospital. There was also no organized distribution of responsibilities regarding fire fighting among security personnel of the hospital. Training regarding fire safety was done regularly, however the training was limited to the demonstration of the use of a fire extinguisher. There was no record of any mock drills regarding evacuation of patients from inpatient areas.

h) Disaster Plan, Patient Evacuation & Collaboration with External Agencies: In the unfortunate event of a fire inside a hospital, the response usually consists of three aspects i.e. fire fighting, patient evacuation and salvaging of expensive medical equipment if possible. The hospital did not have any documented disaster management and evacuation plan. No concept of "Code Red" which is followed widely in most hospitals today in the country was noted. There is an absolute requirement of a command center to execute the rescue operations and coordinate with external agencies. The fire exit doors were kept locked all over the hospital for safety of patients and to prevent unauthorized access to in patient areas.

Discussion & Recommendations

Planning for fire prevention is the first and the most important step towards fire safety. However, no matter how perfect the prevention plans are yet the possibility of a fire accident always exists. In our study the hospital under consideration was a public hospital of national importance yet fire safety was not up to the mark. The administration has good awareness about fire safety but it lacked in implementation. The knowledge and the implementation of fire safety codes or standards are recommended to ensure that hospital fires don't end up in disasters. (1). There is a robust fire detection and alarm system however it has not been maintained. The similar observation was noted at a prominent private medical college hospital in Bhubaneswar after a fire disaster. Post incident analysis revealed that there are no follow-ups with fire department on maintenance of fire alarms/ sprinklers. (18). The Installation and maintenance of automatic fire systems are crucial in ensuring in fire safety. (1) (19). Fire alarm systems must be designed for early detection, accurate location detection, automatic fire department notification, and control of power supply systems, and elevators. (20). However, in the current hospital the existing fire alarm systems were not functional while some places the work was still incomplete due to legal tussle between the vendor and the hospital. This is not new and WC Ong et al have mentioned that poor planning and management of fire safety is one of the common problems in hospitals. (19). Repeated training of all categories of hospital staff in

firefighting and fire safety is extremely important. The local by law states that mock drills should be held at least twice a year and the observations must be recorded. However, no such records of any mock drill and evacuation were found in this hospital. In fact, Pal Indrajeet et al have mentioned in their article that mock fire drills take place occasionally and in metro cities only. It is worth noting that the seriousness of the authorities regarding fire mock drills is reflected by the incident in Bangalore in February 2012 when a 23-year-old woman was killed during a fire mock drill and media ridiculed the emergency services department for mocking every aspect of safety. (17). Martchenko et al mention that Hospitals need to work with local governmental agencies and internal hospital departments to improve disaster preparedness. (21). The role of security guards and senior security personnel is extremely important in a hospital when considering fire security. It is important to train security staff in firefighting and in evacuation of patients. However, in many hospitals the role of security is unclear. (19). In this hospital also, it was noted that the involvement of security guard in firefighting, fire safety activities and patient evacuation was minimal to non-existing. The operation theatres are extremely vulnerable to fire accidents. The constant use of anaesthetic gases, flammable disinfectants and use of cautery, laser and a myriad of electronic gadgets provide all the three ingredients to complete the fire triangle i.e. oxygen, ignition source and fuel. The risk of fire inside the operation theatre can be reduced only if the operating theatre staff understand the importance of fire safety and their vulnerability due to the above factors (22). Lists of fire prevention techniques and steps to taken in the eventuality of an hospital fire are should be mentioned in the Fire Safety Manual. However, this manual was not available in this study hospital. Similarly, literature provided much evidence that evacuation plans must be documented and readily available in hospitals. Though evacuation in hospitals are extremely rare yet they are extremely important as the consequences of these evacuation are critical (23). Evacuation time draws major attention because of diverse population, mix of patient conditions, and multiple units on one floor. (24). However, in the current hospital there is no documented evacuation plan. On the other hand, as commonly noted in most hospitals, for security of infants, children and psychiatric patients, egress doors are kept locked (25). NABH states that there must be an agreement with another hospital for evacuation. There is sufficient evidence that the lack of a prior agreement for providing shelter in the eventuality of a disaster has often led to widespread confusion in tracing and identifying patients following evacuation. (23). No such arrangement was available in this hospital under study. Having a prior agreement with other facilities to shift patients in case of a disaster made it easy to execute an evacuation plan. (26) Similarly a unified, centralised command structure, single authority and clearly responsibilities contribute to successful evacuation. Simple, flexible disaster plans with minimum staffing is needed. (27). Equally important is that combustible material is kept in a secured manner.

Based on the deficiencies identified the following measures are recommended to implement a fire safety plan in a hospital:

a) Fire Safety Committee: Hospitals must have an apex body responsible for firefighting, patient evacuation and salvaging of hospital property as far as possible during a fire incident. This committee would ensure statutory compliance to fire safety norms.

b) Fire Safety Manual: every hospital should develop this manual which would contain all SOPs for dealing with a fire incident in the hospital.

c) Regular Internal Audits: There should be an internal team to conduct periodic audits of fire safety compliance regularly.

d) Budget for Fire Safety: Lack of funds is often cited as a reason for noncompliance to fire safety practices (25). Hospitals must have a dedicated budget earmarked for compliance to fire safety practices.

e) Fire Safety Team: There must be dedicated fire safety staff available round the clock in the Fire Control Room. The number of persons must be adequate as per the size of the hospital. There must be a senior Fire Safety Officer with professional training in fire safety practices.

f) Repeated Training: The firefighting team of the hospital must be exposed to repeated training not only in using fire extinguishers but also in evacuation practices. There should be repeated training of the hospital staff and the same documented on training cards of each individual employee.

g) Evacuation Plan: Hospitals do not always face a major fire incident. An isolated fire incident inside a hospital must not disturb the functioning of patient care services. Due to the complex needs and unstable condition of many hospital patients, evacuation is generally

considered as a last resort. Evacuation should be ordered only when absolutely necessary and when there is an unavoidable threat to safety of patients or staff (28). It is recommended that hospitals develop a two-stage fire response code. The initial response can be regarding firefighting and the second stage can be the evacuation process. Not every incident escalates to an evacuation. The incident commander can activate the fire evacuation code only if it is felt that the fire incident cannot be controlled and evacuation is imminent.

CONCLUSION

Fire safety is of paramount importance in modern hospitals. There are clear statutory guidelines regarding fire safety compliance for hospitals in the country. Hospitals tend to invest in fire safety compliance primarily with the motive to obtain statutory clearance at the time of commissioning. Diligence regarding fire safety usually fizzles out till a major incident awakens the entire hospital community. This study attempts to explore the fire safety compliance of a large tertiary care teaching public hospital with multiple high-rise buildings. It was found that the authorities have invested heavily in the fire alarm systems and there is a dedicated control room. However much of the equipment and electronics have not been maintained over the years that has rendered them nonfunctional. Fire safety team is inadequate and poorly trained. There are no SOPs regarding fire safety and evacuation plan is not available or ever practiced. Based on these findings the study has made several recommendations to improve the fire safety compliance of the hospitals.

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