Analysis of Fire hazard in healthcare Buildings through Media Elicitation

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Abstract

A large number of devastating fires in Indian healthcare buildings brings out all the lacunae in the hospitals' fire safety in terms of presence of safety systems, safety regulations, fire-fighting equipment, rescue protocols and prevention mechanisms. Hospitals are spaces for care and rehabilitation. They often provide different levels of patient support. It is important that there is a safe environment for the patients and the employees that work in the hospital.

However, there are risk factors related to the building that can be a threat to the safety of the patients and employees like a fire in the building. This research presents analysis of past fire events in healthcare facilities in India. It includes evaluation of the past incidences through a systematic analysis of selected incidences based on media elicitation method aimed to find out the reasons, identify the issues related to evacuation process focusing on architectural parameters. Analysis and disseminating lessons from past incidents presented in this research are aimed to learn from past experience and thus improve future responses.

Keywords: Healthcare, Fires, Safety systems, Media elicitation.

Introduction

Fire is one of the main reasons that causes most unnatural deaths in India after road accidents and drowning. On an average, in India, every year, about 25,000 persons die due to fires occurred both in industrial and non-industrial buildings like healthcare facilities, commercial centers, institutional buildings, assembly halls, hotels, domestic buildings[5] (Fire and Security Association of India). Study of past disasters can provide valuable information about specific contexts that caused the damaging event. The complex impacts of disasters provide an impulse to learn and translate the lessons into behavioral change. Disaster is the failure of existing cognitive and material safety provisions which represent a complex phenomenon. Research regarding disasters calls for a learning process from past empirical experiences[17].

Mass media is considered as the primary source of information after environmental or man-made disasters which include television, radio, or printed media, internet-based[12] which emerged as an important communication tool[9]. Anderson[1] explains social media as a group of Internet-based applications that build on the ideological and technical basics of Web permitting the formation and exchange of user generated content. The information, amateur photos from social media become significant to disaster response efforts as they provide prompt, applicable and reliable information in the immediate post-disaster time period, activities that are developing for the reason due to persistent Information and Communication Technology[12].

This research is based on media elicitation method which is widely used method in disaster research. The information about incidences has been collected from different media sources that include digital and print media both. Each information is validated and after triangulation, the findings are analyzed.

Fire in Healthcare Facilities: Fire in healthcare facilities is a common phenomenon all over the world. In a period from 2012 to 2014, about 5,700 fires were reported in the healthcare facility in United States out of which 1,100 fires were in hospitals. The reported causes include cooking, electrical malfunction, heating and intentional actions[4] (FEMA). A fire occurred in an operation theatre at the Twenteborg Hospital Almelo, Netherlands in September 2006 with an anesthesia machine. The reason was poor maintenance of the machine which was connected to an oxygen supply that fuelled the fire which developed rapidly. Generation of a lot of heat ignited the plastic components of the machine as well as other equipment causing the fast production of smoke. The fast development of the fire made it difficult to move the patient who was fixed to a bed[7].

Fire occurred at a hospital new building in south-western South Korea on May 27, 2014 killing 21 people and injuring seven others. Out of the total casualties, one was nurse and 20 were senior patients, many of whom were hospitalized either for mental disorders or stroke complications. Out of them, hands of some dementia patients were found tied to their beds and grills were provided for the windows to prevent patients from falling out. Another incidence was Great Ormond Street Hospital fire that took place on Monday, 29th September 2008, where an oxygen cylinder blasted in a side room affecting the ceiling to collapse.

Indian Scenario: The incidences worldwide demonstrated that fire accidents can lead to a huge loss of life and assets if not handled carefully. This aspect is of prime importance in developing countries like India where a total of 18,450 cases of fire accidents were reported in 2015 with 1,193 persons injured and 17,700 killed (NCRB). The country has faced

many incidences of fire breakout in healthcare buildings which resulted in considerable losses in terms of precious lives and financial assets.

SUM hospital, Bhubanaveshwara fire 2017: A fire incident occurred at the SUM hospital in Bhubanaveshwara on 17th Oct 2017 at around 7:30pm on its second-floor dialysis unit. An electrical short circuit is suspected to be the cause to trigger fire. There were 23 deaths reported due to suffocation and smoke inhalation whereas 120 were injured. Critical patients were taken off life support leading to several deaths[2].

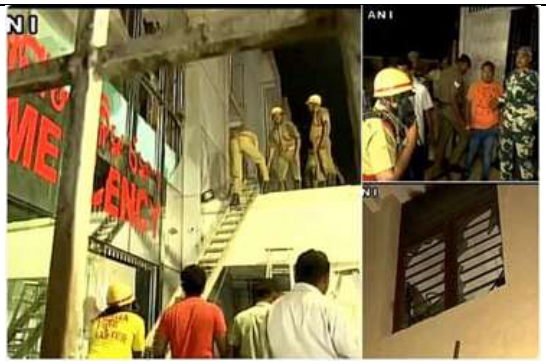

Fig. 1: Ongoing rescue operation at SUM hospital[2].

Initially hospital staff tried to douse the fire with two fire extinguishers for nearly 20 minutes. Fire service personnel were informed when the situation went out of control. During the process, they lost the critical time for fire-fighting. The fire immediately spread through an oxygen pipeline to the dialysis unit, the intensive care unit (ICU) and the emergency ward of the hospital.

Fire tenders reached the spot and brought the fire under control. Seven fire tending vehicles took more than 2 hours to bring the blaze under control. A Bronto Sky lift has been pressed into service to rescue 500 indoor patients who were trapped in the building by breaking open door and windows. In 2013 a fire audit report had found lapses in the fire safety measures that were not fulfilled. The reason was lack of communication, negligence and lack of firefighting preparedness.

AMRI Hospital Kolkata Fire 2011: A massive fire incident occurred around 3:30 am in an annex building basement of the seven-storeyed AMRI hospital Kolkata on 9th December 2011.

The hospital authorities did not inform the fire department about the incident. It was the local police station that made the call, the fire fighting force reached the spot almost two hours late due to the narrow lane (with parking on both sides) leading to hospital building. 28 fire-tenders and three sky-lifts were pressed into action and the blaze was put out late in the afternoon. As per report the basement where the fire started, housed a pharmacy, a central storeroom and the biomedical department, all containing inflammable articles. The building was centrally air-conditioned and there was no ventilation channel for the smoke to come out. Poisonous smoke was sucked by air conditioning ducts that carried it through the rooms and the corridors of the seven-story centrally air-conditioned hospital.

The fire spread fast from the basement of the hospital, engulfing one ward after the other and trapping hundreds of people. While many patients died of burns, most died due to suffocation caused by carbon monoxide accumulation all over the building. Total 164 patients were admitted in the hospital, out of them 90 patients died mostly who were on life support system and due to asphyxiation. The survivors were shifted to five hospitals. The hospital fire safety systems were inadequate. The behavior of hospital staff and doctors was disputed as per report[15].

Fig. 2: Ongoing rescue operation at AMRI hospital.
Source: Indiatoday.in

SCB Medical college Cuttak, Odisha 2016: This is a usual case of repeated fire incidents that have taken place in SCB Medical College, Cuttak, Odisha due to inadequate firefighting preparedness and lack of safety measures. A fire was caused by a short-circuit in one of the air conditioners in the duty room of the doctors and nurses on the second floor on May 31st, 2016. Panicky situation arose when the fire broke out at 3.30pm. The authorities shifted all the patients as entire corridor and other spaces were filled with black smoke. Windowpanes were broken to create outlet for smoke.

Three fire tenders were deployed to douse the flames. Twenty fire personnel took nearly half an hour to bring the fire under control. No one was injured in the incident. The authorities had to shift out 104 patients from the wards of Institute of Cardiovascular Sciences. These included 20 patients undergoing treatment at the two intensive care units (ICU) located on the floor where the fire broke out. Inadequate fire safety measures were reported[14].

The second fire erupted in the main operation theater (OT) of surgery department at the hospital on 14th Feb, 2019. Soon after, a firefighting team started to douse the flames. Short circuit was suspected to be the cause behind the fire.

No casualty or injury was reported in the incident[11]. Fire broke out the third time on 8th April 2019 at the records section of the SCB medical college and hospital in Odisha's Cuttack city. Many important documents were reportedly reduced to ashes in the blaze. No casualties were reported. Fire department was informed, acted immediately and reached the hospital and doused the flames. The reason of the outbreak of fire is unknown[10].

ESIC Kamgar hospital, Marol, Mumbai, 2018: A fire accident took place at ESIC Kamgar hospital, Marol, Mumbai claiming the lives of 10 people on December 17, 2018. As many as 140 people were rescued from the spot. An investigation that was conducted two days later revealed that the fire was caused due to sparks flowing from a welding machine that was being operated nearby. No safety measures were adopted by the hospital and the two workers who were operating the welding workers absconded from the spot. The MIDC police arrested the contractor who got the contract for the construction happening in the hospital[2].

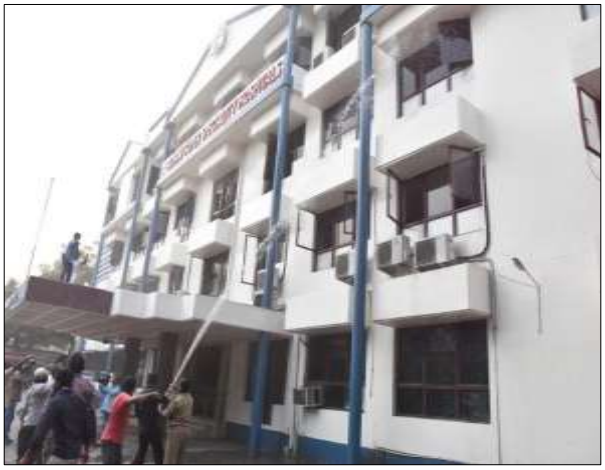

Fig. 3: Fire fighters dousing the fire during the rescue operations at Rohini hospital in Warangal[16].

A fire broke out in Rohini Hospital which is a three storey building in Hanamkonda Subedari, Telangana on Monday, October 2017 at 4:30 pm, when workers were replacing an oxygen cylinder in operation theatre on the third floor. It is suspected that there was a short circuit in the intensive care unit (ICU), which was located near the operation theatre on the second floor of the three-storied hospital building. It caused the blast of the oxygen cylinders, spreading the fire and thick smoke. Two surgeries were underway when the theatre caught fire. The staff of the hospital had not responded in time to rescue the patients from the operation theatre and ICU[13].

Local residents helped in evacuating patients from the operation theatre and ICU. Fire safety systems were in place but fell short in operating during the event. Panic spread as the emergency firefighting system including fire hose failed to work. The hospital did possess the no objection certificate related to fire from the GWMC. Two deaths and two severe injured patients were reported out of total 199 patients, where the rest were shifted to six other hospitals in the city.

A major fire broke out on 27th Aug, 2016 in a Government hospital's medicine department in West Bengal's Murshidabad district, killing 3 and injuring 50 children as the fire spread to the neonatal unit of the hospital on Saturday. Several more were reportedly trapped in the hospital. The fire was caused due to a short-circuit in the medicine department of the hospital. The fire spread from the AC of a VIP cabin on the first floor. Soon after the fire broke out, patients were seen coming out of the hospital while some infants were taken out of the hospital ward.

Many patients broke windows to escape from the hospital. Panic prevailed in the hospital as people ran haphazardly leading to a stampede[6]. The emergency exit door of the hospital was closed causing chaotic situation along the escape route. There was no disaster management plan in place[18]. Two fire tenders were rushed to the spot to douse the fire.

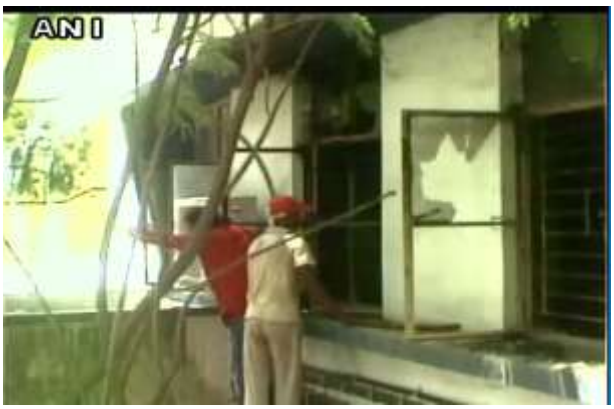

Fig. 4: Patients break windows to escape from Govt hospital in Murshidabad[6]

A fire triggered in Shishu Bhavan Pediatric Hospital situated in Cuttack on 15thNov 2015. Patients had a narrow escape on Sunday after fire broke out in the newly born children ward of the hospital. The reason for the fire is suspected to be a short circuit due to which sparks triggered out from one of the warmers meant to heal new born which was housing 20 patients, three of whom were under life supporting systems at the time of the mishap. The incident triggered panic and chaos in the ward with 22 newborns, which were evacuated by hospital staff and attendants immediately[8].The fire services department rushed with three fire tenders to the spot and the flames were brought under control after one hour. No casualty was reported.

Discussion

The major causes of fire based on analyses were electrical short circuits, presence of combustible material, deliberate human act and explosion of gas cylinder, pyro techniques, carelessness and ignorance. The major causes for casualties were found deficient in architectural planning aspects such

as complex layout of building, inadequate staircases and exits, inadequate safety systems and way finding difficulties. Other reasons identified which hampered the evacuation of inhabitants were exit doors shut or opening inside, obstructed staircases and passageways, storage of gas cylinders near kitchen platform and fireworks display.

It was found that many hospital buildings were located in high density area which was accessible by narrow lanes that delayed the rescue operation and resulted in increasing the rate of casualties. Research reveals that there is a lack of study of disaster response in India with reference to fire safety from architectural perspective.

Existing codes designed for fire safety and emergency situations are based on physical characteristic and infrastructural requirements where occupant's response is not addressed adequately. Fire safety is often viewed as a provision of building and hardware systems such as fire resistance grading, fire escape, automatic sprinklers and smoke regulator.

It has been observed that these integral features do not essentially generate occupant safety at the anticipated level. It is stressed that the healthcare providers' need direction to; in what way an event command organization would take effort in a mass fatality incident and immediate role to perform in case of occurrence of fire. Most of the healthcare facilities need for basic and advanced life care, sanitization and segregation procedures, triage modus operandi, personal security mechanisms; and usage and monitoring of emergency apparatus. Safety of healthcare facilities is a serious issue to tackle this situation. Fundamental changes in health care processes, culture and the physical environment are required to facilitate the caregivers and the resources for enabling safe care.

Conclusion

History of fire occurrence is full of valuable information which needs to be studied in the present context. This research investigated the past trend of fire hazard to elucidate major factors and major fires at global as well as at national level with respect to typology of building, reported cause of fire and damage along with the casualties reported. This research provides a unique opportunity to use current and emerging evidence to improve the physical environment in healthcare facilities to render them safe from fire hazards.

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(Received 10th March 2020, accepted 12th May 2020)