Case Report

Fire incidents in Bed-head panels: Causes and recommendations for prevention

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Abstract

Disaster incidents leading to massive obliterations often bring to the forefront the inadequacies of the systems, infrastructure as well as personages. In healthcare settings, these imperfections are usually exhibited specifically during fire disasters. This case report details a true fire incident that erupted in a patient bed-head panel of an emergency complex room and describes the real-life challenges encountered by the emergency staff in preserving both life and property. Bed-head units encompass both electrical and medical gases: a structural component quite common in modern hospitals. Precautionary measures should be implemented to mitigate such incidents, as well as specific attention, should be made during the designing and installation of these bed-head panels. Better coordination, scheduled training, and fire drills can improve the overall outcomes and minimize the possibility of these potentially fatal problems, thereby, making a safer healthcare environment for every worker and patient.

Keywords: Bed-head panels, disasters, fire incidents, prevention

Introduction

Disasters whether floods, earthquakes, cyclones, droughts, or extensive fires have a strange ability to bring to the forefront the inadequacies of the systems, structures, processes as well as of people leading to massive obliterations. These imperfections get accentuated very often when a particularly serious incident happens.[1,2] In healthcare settings, these imperfections are exhibited usually during fire disasters. To mitigate these crises situations, healthcare professionals have to be proactive, swift, and alert always. They have to demonstrate courage and a sense of duty during rescue efforts.

In healthcare settings, the origin for a majority of these fire incidents has been electricity linked causes, specifically along the bed-head side of the patient care areas, as these areas have rich oxygen density, equipment complexity, web of cables, abundance usage of highly inflammable chemicals, and hand sanitizers.[3-7] Generally, a bed-head panel consists of modular sections (usually 4–14 numbers), for electrical supply to run monitors, ventilators, and defibrillators along with points for illumination, communication, and medical gases, liquids, and anesthetic gas scavenging systems. Though these bed-head units operate reliably and safely, yet leakage from these gases' outlets cannot be ruled out completely.[5,6,8-10] Similarly, there is always a possibility of either spark or short-circuiting in the electrical gadgets or outlets due to faulty equipment or sudden malfunction of the working equipment. Henceforth, the availability of an oxygen-rich environment, complexity of equipment, and highly inflammable materials may easily turn a relatively harmless spark into a flame and rapid ignition of materials.[6,7,9]

This present case study seeks to evaluate the root cause of a fire incident reported in one of the bed-head panels in the Advanced

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Trauma Center (ATC) of one of the tertiary care hospitals in North India.

Case scenario

The institute is a leading super specialty, tertiary-level, teaching, 2,000-bedded hospital with a 100-bedded ATC facility. The institute has a primed fire safety program with its fire department and a robust fire prevention system in place.

On March 23, 2021, at 1512 h, a fire broke out at level two of the ATC when the nursing staff noted a flame in one of the bed-head panels, and within a few minutes, the whole area was filled with smoke. Immediately, Code Red was alerted, and the fire control room was contacted on the dedicated lines. At the time of the incident, there were 68 critical/sick patients in the affected area and with the help of the nursing and security staff, all patients were immediately evacuated to the safe areas/gathering areas. The fire safety personnel doused the fire. The medical gases supply and electrical supply to the area were disconnected as a safety measure. The windowpanes and doors of the affected area were broken for the exhaustion of smoke.

The engineering and manifold services also reported within minutes to inspect the site of the incident. The immediate cubicle was sealed for repair and root cause analysis of the incident. After thorough inspection and maintenance work and due clearance by the electrical, biomedical, and manifold departments of the institute, all services were restored. No casualty was reported. No major loss of property was reported. The prima facie after thorough inspection and inputs from all the stakeholders, it was totaled that the fire might have occurred due to a spark in one of the electric points of the panel which had initiated ignition in the lint already deposited in the point overtime and was augmented by the leakage of oxygen from the oxygen outlet in the bed-head panel itself [Figure 1]. A few such incidents have been reported by Sankaran K *et al.* in the Neonatal Intensive Care Unit (NICU) of the Royal University Hospital, Saskatoon, Canada, where the fire had been reported in the sealed cabinet enclosing the electrical wires and manifold pipes and the reason of fire had been stated as a spark igniting lint, allowing the cabinet's relatively fire-resistant materials to burn easily.[8] In the institute itself, two such fire incidents in the Bed-head panels have been reported earlier in the intensive care units (ICUs).[11] In the institute itself, two such fire incidents in the bed-head panels have been reported earlier in the ICUs.

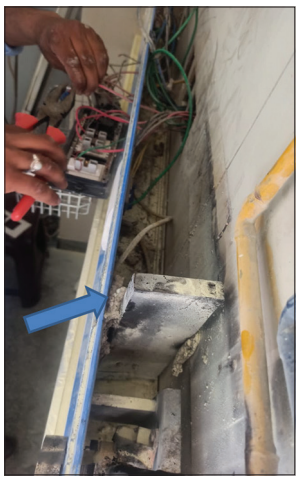

Figure 1: Bed-head panel

Henceforth, after detailed deliberations and fact-finding, it was accentuated that regular cleaning and scheduled maintenance of these panels are some of the key factors for mitigating such incidents. Also, measures shall be explored to have the panels with segregated electrical and manifold units.

Discussion

Fire is the rapid oxidation of a combustible material (fuel) in the presence of an oxidizer (oxygen) and an ignition source, thereby, releasing heat, smoke, light, and gases of chemical nature.

It is often stated that combustion occurs more readily in the presence of an oxygen-enriched environment.[5-10] In Wolf *et al.*'s[7] study, the probability of combustion of surgical drape materials was tested in 21, 50, and 95% oxygen concentration, and as expected, the findings stated that the higher the concentration of oxygen, the more readily the material could be set on fire. The time duration for ignition in 21% oxygen was a mean of 12 s and it decreased to a mere 0.1 s in 95% oxygen. Culp *et al.*'s[12] study has shown similar results with various operating room (OR) materials suggesting that the ignition time as well as burning time decreases significantly with increased oxygen concentration. Further, the equipment usually keeps functioning 24 × 7, especially in the critical care areas; and the possibility of a spark, overloading, and short-circuiting cannot be ignored. Thus, it is well understood that though the risks associated with bed-head panels cannot be fully eliminated, it is advisable to adapt/implement optimal fire prevention measures in the design phase itself and comply with the prevalent fire codes.[13] Besides this, laid down strategies and regular drills are vital to ensure that the staff is fully aware of the actions to be taken during any hazardous situation. And, it is a well-established fact that irrespective of any disastrous situation whether it is natural or otherwise, internal or external, healthcare professionals always have to shoulder unique responsibilities for the safety of humankind.

Conclusion

Therefore, specific attention should be made to the design and installation of electrical services and manifold supplies complying with the building codes and other technical regulations strictly. Regular maintenance and scheduled services form a vital link in mitigating any fire risk due to the failure of the electrical circuits and medical gas services.

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Conflicts of interest

There are no conflicts of interest.

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