IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, June 2024

Assessing and Improving Fire Safety Measures of Healthcare Facilities with Special Reference to Pedestrian Flow Evacuation Simulation and Evacuation Dynamics

Pravin Tathod[1] and Hardik Dixit[2]
Professor, Department of Industrial Safety Engineering[1]
PG Scholar, Department of Industrial Safety Engineering[2]
Shiv Kumar Singh Institute of Technology & Science, Indore, India

Abstract: *Fire protection and safety measures in hospitals are of utmost importance to ensure the safety of patients, staff, and visitors. In case of a fire, it is crucial to evacuate people safely and quickly. However, evacuation in hospitals is a complex process due to the presence of patients with varying degrees of mobility, staff, and visitors, and the hospital's unique layout. This project aims to assess and improve fire protection and safety measures in hospitals, focusing on pedestrian flow evacuation. The project team conducted a comprehensive literature review of various research papers to gain a better understanding of fire basics, the leading causes of death in case of fire, and the challenges that arise during evacuation. The literature review revealed that fires in hospitals are rare, but when they occur, the consequences can be catastrophic. The leading cause of death in case of fire is smoke inhalation, and the most significant challenge during evacuation is the movement of patients with mobility issues. The literature review also highlighted the importance of smoke detection systems, sprinkler systems, and fire-resistant materials in hospitals. These systems and materials can significantly reduce the risk of fire and minimize the damage caused by a fire. Additionally, the literature review revealed that the use of ire drills is critical to prepare staff and patients for an emergency. To gain a better understanding of the challenges that arise during evacuation, the project team conducted interviews with hospital staff and patients. The interviews revealed that the most significant challenge during evacuation is the movement of patients with mobility issues. These patients require specialized equipment and assistance to move, which can slow down the evacuation process. The interviews also revealed that staff training is critical to ensure an efficient evacuation process. Staff members need to be trained on the proper evacuation procedures, the location of emergency exits, and how to use specialized equipment during evacuation. The project team created a simulation of a hospital floor with pedestrians to investigate the dynamics of evacuation. The simulation revealed that the movement of patients with mobility issues significantly slowed down the evacuation process. The simulation also highlighted the importance of clear signage and staff guidance during evacuation. Based on the literature review, interviews, and simulation, the project team identified several ways to improve fire protection and safety measures in hospitals. These include conducting regular fire drills to prepare staff and patients for an emergency, installing smoke detection systems, sprinkler systems, and fire-resistant materials in hospitals, and providing staff training on proper evacuation procedures and the use of specialized equipment during evacuation. By implementing these measures, hospitals can improve their fire protection and safety measures and ensure the safety of patients, staff, and visitors during an emergency. The project takes hospital occupancy as the research object, sets the fire scenario, manipulates Pathfinder simulation software to establish the evacuation model, studies the evacuation rules in fire, ascertains the key problems in evacuation, and gets the maximum number of people evacuated during the safe evacuation time*

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, June 2024

Keywords: Health care facility, Hospital, Fire, Safety, Evacuation, Pedestrian, Smoke ventilation, Mobility, Safety measures etc.