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Abstract

A healthcare building is a place for the patient's treatment. Hospital resilience is defined as the medical facility's capacity to withstand a disaster, maintain and expand their medical capacity, and respond to a sudden increase in patient demand. There has been a global outcry from fire outbreaks with hospital building being affected. From 2010 – 2019, 14 cases of deathliest fire happened in the hospital building around the globe. All of these fatalities occurred as a result of the failure of fire escape routes, locked exits, lack of staff evacuation training, lack of awareness, and lack of safety measures, particularly on the fire escape itself. The leading causes of fire outbreak are human factors such as carelessness, negligence and lack of fire safety awareness. Therefore, this research intended to evaluate the level of user's awareness towards fire escape in hospital. Questionnaire survey were distributed to 90 respondents who is user of the hospital. The results were analysed using SPSS descriptive analysis and presented in the table form. Based on the analysis, 90% of the respondents are aware and strongly aware. The three top ranking of user's awareness are using a staircase is much safer instead of using lifts, people will be warned if a fire is discovered, there is a person responsible in case of fire and the existence of fire escape in the hospital. It is recommended that the hospital management share and provide information for the users regarding the nearest fire escape available to the user. As this paper only considers the level of awareness on fire escape in hospital, further study is needed to identify in detail the design criteria of fire escape in hospital building.

Keywords: Fire Safety, Fire Escape, Hospital

Research Background

A healthcare building is a place for the patient's treatment. Hospitals are typically regarded as safe havens and serve as a support system in the event of an emergency (Taaffe et al., 2006). While Mercy Malaysia (2017) added that the hospital must be resilient at all times. Hospital resilience is defined as the medical facility's capacity to withstand a disaster,

maintain and expand their medical capacity, and respond to a sudden increase in patient demand (Cristian, 2018). There are four resilience's indicators that has been defined by Zhong (2014) as robustness(Rb), redundancy(Rd), resourcefulness(Rs) and rapidity(Rp). There has been a global outcry from fire outbreaks with hospital building being affected. From 2010 – 2019, 14 cases of deathliest fire happened in the hospital building around the globe. Among the cases are, 10 cases of deathliest fire reported in India (Polgreen and Kumar, 2011; Jaiswal, 2015; Banerjee, 2016; TNN and Agencies, 2016; Yengkhom, 2016; Chitnis, 2018;), three cases reported in Malaysia (Bernama, 2011, 2014; The Star Online, 2014; Hammim, 2016; Shah and Ahmad, 2016), and one case happened in Solomon Island (Regional, 2016). 650 casualties reported around the globe reported regarding the deathliest fire. All of these fatalities occurred as a result of the failure of fire escape routes, locked exits, lack of staff evacuation training, lack of awareness, and lack of safety measures, particularly on the fire escape itself (Polgreen and Kumar, 2011; Singh, 2011; Banerjee, 2016; Yengkhom, 2016; Jr, 2019;). Besides, Yeturu et al (2016) stressed that users were unaware about the fire prevention and control guidelines and regulations about any government or private bodies. While Kulkarni, Giri and Gangwal, (2016) reveal that the leading causes of fire outbreak are human factors such as carelessness, negligence and lack of fire safety awareness. Therefore, this research intended to evaluate the level of user's awareness towards fire escape in hospital.

Literature Review

Hospital building is part of healthcare institution building. It is functioning as a place for the patient's treatment. Wabo et al (2012); Sandra et al (2017) described hospital as a key factor in providing emergency services to the communities. It is expected to be fully functional, safe to be used, and resilient. Hospital is a special place and facility that provide treatment for patients with various illnesses physically, mentally or chronic disease. The hospital has also acted as living accommodation, living place and facilities for occupants incapable of self-preservation (UBBL, 1984; Billington et al., 2002; National Fire Protection Association, 2012; Neufert et al., 2012). De-Ching et al (2011) added that the hospital is a very safe facility, but when it comes to fire, it becomes unsafe. It also causes the patients to have to have danger in pursuing their health.

The process of designing fire escape routes is intricate. It necessitates the identification of the occupants' needs, which must be compatible with the fire escape provision stipulated by the regulations. Besides, it should take into account the form of the building, the activities inside the building, the likelihood of fire and the potential of fire spread through the building (Abu Bakar, 2006). However, the complexity that worsens the evacuation process is due to several factors: (i) different types of patients (ambulant and non-ambulant), (ii) existence of dangerous and flammable material, and (iii) the need of assistance for patients during evacuation (Connolly and Charters, 1997; Golmohammadi and Shimshak, 2011; Simsek and Akinciturk, 2015; Bongiovanni et al., 2017)

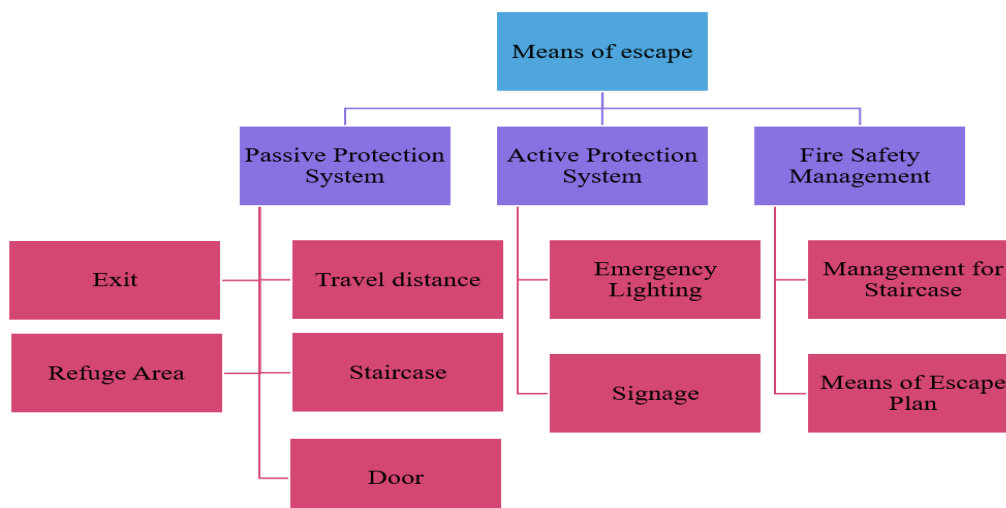


Figure 1: Design criteria of fire escape

In a comprehensive study of Cao et al (2018), there are several features need to be highlighted related to fire escape. They are, (i) occupants tend to escape to the nearest exit, (ii) poor visualness delayed and increased the evacuation time for occupant's, and (iii) occupants tend to follow other people during evacuation especially due to poor visualness. This also just as it has been studied by De-Ching et al (2011) that poor visibility will prevent occupants from seeing clearly and it may result to endanger the life safety of occupant's. Therefore, it is needed to study the availability and enforcement of building regulations on fire escape.

The design criteria of fire escape can be categorised into three main categories (Jaafar & Abdul Talib, 2017). The categories are (i) passive fire protection, (ii) active fire protection, and (iii) fire safety management.

The first criteria is exit. Each room at each floor should at least have two exits. This is explained by Hagiwara & Tanaka (1994) that when one fire escape is blocked by smoke or fire, the other one could be used by users to escape. The second criteria is refuge area. Design criteria for refuge area in any building in Malaysia are not dealt with any regulation contained. However, NFPA 101 requires refuge area to be one of the important design criteria for fire escape specifically in hospital. The third criteria is travel distance. Travel distance is the horizontal length of the first path of the fire escape route (Marchant, 1972). According to Department of Standards Malaysia (2013) in MS 1471 travel distance can be defined as a distance that needs to be travelled from any point in the building to a protected escape route, external escape route and lastly to the final exit. The fourth criteria is staircase. Staircases is one of the important elements that serves as the primary escape route element and means of vertical travel in the building. Building regulations require at least two separate exit staircases.

The fifth criteria is door. UBBL 1984 defines an exit door as a door from any storeys or rooms that gives access to the exit route. The door should be readily openable at all times when a building is occupied. However, if the doors are left open, it will become no value at all. The door is required to keep closed automatically after release as required by UBBL 1984: 173(2). The sixth criteria is signage. Signage is used to communicate with the users about information on evacuation. Furness & Muckett (2007) state that it is essential for a speedy escape in a building where many of the users might be unfamiliar with the building layout. It

is necessary to ensure that a person is quickly aware of the direction he should take to a safe place in case of fire. The seventh criteria is emergency lighting. Emergency lighting is essential especially in the event of short circuit causing the electrical supply disconnection. Langdon-Thomas (1972) state that every escape route should be provided with sufficient amount of lighting. This is to assist the user in seeing their way out safely specifically during the evacuation. The last criteria is fire escape plan. A fire escape plan is a plan that shows the path that the user in case of fire would use. Fuller (2008) adds that the fire escape plan is used to assist users and specifically to the visitor to evacuate.

Among the critical factors highlighted by Jaafar et al (2022), user awareness is the first highlighted critically factors. A hospital building contains many users exposed to fire in one location (Sanni-anibire & Mohammad, 2015; Hassanain et al., 2018; Zakaria et al., 2019). When a fire breaks out, the large number of users frequently crammed into a high-rise building presents a challenge for hospital management in terms of a fire evacuation. Furthermore, passive attitudes of the users and management also lead to difficulties in fire safety (Ebenehi et al., 2018; Osunsanmi et al., 2019). Sanni-Anibire and Hassanain (2015) suggest that the primary causes of fatal fires and casualties in hospital are smoking, intentional activities, and electrical issue. These cases point to human ignorance and a lack of concern and awareness about fire safety. Users' incidents of fire alarm pranks also contribute to fire casualties, resulting in user ignoring the actual alarm and becoming late in responding to emergencies. This situation will lead to an argument on what happens when user only have a short period to react. It is either the user should extinguish the fire or evacuate. It can be concluded that human awareness is the critical factor that must be considered to ensure that a fire safe hospital can be achieved.

Awareness plays a big role in a person's conscience in deciding an action. This is applicable for the awareness on fire escape. Previous studies showed that people still lack awareness towards fire escape although necessary signage is available as reference. Djunaidi & Pratiwi (2015) stated that management of hospital still lacks awareness and knowledge of the standards to meet the fire protection system and means of evacuation. Regarding this matter, this implicates poor managerial decision making due to the lack of awareness which resulted in large losses of life during fire outbreaks. Groner (2016) mentioned that, the person in charge of managing a fire emergency often lacks a clear understanding of the logic fundamental of fire protection features which not surprisingly will make mistakes when responding to the emergencies.

Research Methodology

Nonetheless, this research used a quantitative data approach. A quantitative approach was used for data collection using a questionnaire survey. 90 copies of the questionnaire were distributed to the users of hospitals located in Perak. The questionnaire was divided into two sections. The first section is regarding the general information about the respondents. While the second section required the respondents to answer about their awareness of fire escapes in hospital wards. The Likert scale is adopted to evaluate the user's awareness ranging from 1 to 5: Disagree (1), uncertain (2), partially agree (3), agree (4), and strongly agree (5). The data is being analysed by using statistical analysis with the used of SPSS as the tools for analysis. Table will be used to display the result of the findings.

Analysis and Discussion

Table 1 present the user's awareness of the fire escape in the hospital building. Most of the respondents are aware about the fire escape available in hospital. 90% of the respondents are aware and strongly aware. Based on the table, the three top ranking of user's awareness are that using a staircase is much safer than using lifts, people will be warned if a fire is discovered, there is a person responsible in case of fire and the existence of fire escape in the hospital. Users are aware that they need to use the staircase instead of lifts in case of fire due to the signage available at the lifts. This shows that putting signage in a proper place such as at the lift will act as an information tool for the users (Galea et al., 2017). On the contrary, the three-bottom ranked less aware include the location of fire escape routes, the importance of keeping fire doors closed and the operation of fire exit doors. It was found that users are not aware about the operation of fire exit doors with an average mean value (4.58).

Table 1
User's Awareness towards Fire Escape in Hospital

Description	Mean	Perception level	Ranking
User are aware of the existence of fire escape in case of fire in a hospital.	4.74	Agree	3
User are aware of the location of fire escape routes during fire outbreak	4.67	Agree	6
User are aware of the existence of fire evacuation plans in hospital wards	4.73	Agree	4
User are aware of the location of refugee area	4.70	Agree	5
User are aware that using staircase is much safer instead of using lifts	4.81	Agree	1
User are aware of the operation of fire exit doors	4.58	Agree	8
User are aware the importance of keeping fire doors closed	4.62	Agree	7
User are aware that people will be warned if a fire is discovered	4.76	Agree	2
User are aware that matron is a person that responsible in case of fire especially in hospital's ward	4.74	Agree	3

Conclusion

This research paper's objective was achieved by rank of mean for each description. It can be seen that most of the user are aware about the fire escape available in the hospital. This shows that it is important to ensure that all users are aware of the fire escape especially when fire happened. In case of fire, users can use the fire escape route rather than their familiar route in the hospital. Besides, it will reduce the possibility of difficulty or congestion when there is a fire. However, there are less aware on the few components of fire escape such as fire doors and the location of fire escape routes. This is due to lack of knowledge and information the hospital management provides to the users. Therefore, there is a need to ensure that users are knowledgeable and aware about the fire escape. It is recommended that the hospital management share and provide information for the users regarding the nearest fire escape available to the user. As this paper only considers the level of awareness

on fire escape in hospital, further study is needed to identify in detail the design criteria of fire escape in hospital building.

References

- Abu Bakar, H. (Ed.). (2006). *Guide to Fire Protection in Malaysia* (2nd ed.). The Institution of Fire Engineers (UK) Malaysia Branch (FEM).
- Banerjee, M. (2016). 19 Dead, Over 100 Injured In Major Fire At Bhubaneswar's SUM Hospital: 10 Updates. *NDTV*. <https://www.ndtv.com/india-news/fire-breaks-out-in-icu-ward-of-bhubaneswar-hospital-1475447>
- Bernama. (2011). Fire at HKL started by patient. *The Star Online*. <https://www.thestar.com.my/news/nation/2011/07/30/fire-at-hkl-started-by-patient/>
- Bernama. (2014). One killed in Sarawak GH fire. *Malaymail*. <https://www.malaymail.com/news/malaysia/2014/02/15/one-killed-in-sarawak-gh-fire/619251>
- Billington, M. J., Ferguson, A., & Copping, A. (2002). *Means of Escape from Fire*. Blackwell Publishing.
- Bongiovanni, I., Leo, E., Ritrovato, M., Santoro, A., & Derrico, P. (2017). Implementation of best practices for emergency response and recovery at a large hospital: A fire emergency case study. *Safety Science*, 96, 121–131. <https://doi.org/10.1016/j.ssci.2017.03.016>
- Cao, S., Fu, L., Wang, P., Zeng, G., & Song, W. (2018). Experimental and modeling study on evacuation under good and limited visibility in a supermarket. *Fire Safety Journal*, 102, 27–36. <https://doi.org/10.1016/j.firesaf.2018.10.003>
- Chitnis, P. (2018). Mumbai Hospital Where 8 Died In Fire Had Failed Safety Test Two Weeks Ago. *NDTV*. <https://www.ndtv.com/mumbai-news/andheri-fire-mumbais-esic-kamgar-hospital-where-8-died-in-fire-had-failed-safety-test-two-weeks-ago-1964207>
- Connolly, R. J., & Charters, D. A. (1997). The Use of Probabilistic Networks to Evaluate Passive Fire Protection Measures in Hospitals. In Y. Hasemi (Ed.), *Fire Safety Science-Proceedings of the Fifth International Symposium* (pp. 583–593). International Association for Fire Safety Science. http://www.iafss.org/publications/fss/5/583/view/fss_5-583.pdf
- Cristian, B. (2018). Hospital Resilience : A Recent Concept in Disaster Preparedness. *The Journal of Critical Care Medicine*, 4(38), 81–82. <https://doi.org/10.2478/jccm-2018-0016>
- De-ching, H., Shen-wen, C., Chien-hung, L., Po-ta, H., & Yi-ting, S. (2011). A Study for the Evacuation of Hospital on Fire during Construction. *Procedia Engineering*, 11, 139–146. <https://doi.org/10.1016/j.proeng.2011.04.639>
- Department of Standards Malaysia. (2013). *MALAYSIAN STANDARD*. Department of Standards Malaysia.
- Djunaidi, Z., & Pratiwi, F. (2015). Analysis of Fire Protection System Standard in Hospital : Case Study in Jakarta , Indonesia. *Health and Safety, Ferguson 2005*, 1–10.
- Ebenehi, I. Y., Mohamed, S., Sarpin, N., Wee, S. T., & Adaji, A. A. (2018). Building Users' Appraisal of Effective Fire Safety Management for Building Facilities in Malaysian Higher Education Institutions: A Pilot Study. *Path of Science*, 4(12), 2001–2010. <https://doi.org/10.22178/pos.41-2>
- Fuller, C. (Ed.). (2008). *Fire and Disability 2008: Special Report*. Workplace Law Publishing.
- Furness, A., & Muckett, M. (2007). *Introduction to Fire Safety Management* (1st ed.). Butterworth-Heinemann.
- Galea, E. R., Xie, H., Deere, S., Cooney, D., & Filippidis, L. (2017). Evaluating the effectiveness of an improved active dynamic signage system using full scale evacuation trials. *Fire*

- Safety Journal*, 91(April), 908–917. <https://doi.org/10.1016/j.firesaf.2017.03.022>
- Golmohammadi, D., & Shimshak, D. (2011). Estimation of the evacuation time in an emergency situation in hospitals. *Computers and Industrial Engineering*, 61(4), 1256–1267. <https://doi.org/10.1016/j.cie.2011.07.018>
- Groner, N. E. (2016). A decision model for recommending which building occupants should move where during fire emergencies. *Fire Safety Journal*, 80, 20–29. <https://doi.org/10.1016/j.firesaf.2015.11.002>
- Hagiwara, I., & Tanaka, T. (1994). International Comparison of Fire Safety Provisions for Means of Escape. *Fire Safety Science*, 4, 633–644. <http://www.iafss.org/publications/fss/4/633>
- Hammim, R. (2016). Sultanah Aminah Hospital fire caused by capacitor in ceiling lights: Health Ministry. *New Straits Times*. <https://www.nst.com.my/news/2016/12/198915/sultanah-aminah-hospital-fire-caused-capacitor-ceiling-lights-health-ministry>
- Hassanain, M. A., Garkuwa, J. A., & Sanni-Anibire, M. O. (2018). A code-compliance framework for fire safety in student housing facilities. *Facilities*, 36(7–8), 423–436. <https://doi.org/10.1108/F-12-2016-0099>
- Jaafar, A. S., & Abdul Talib, Y. (2017). DEVELOPMENT OF ASSESSMENT PROCEDURE FOR MEANS OF ESCAPE IN HOSPITAL'S BUILDING IN MALAYSIA. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY*, 6(7), 417–425.
- Jaafar, A. S., Abdul Talib, Y., Ismail, A., & Othman, M. A. (2022). Fire Safety for Residential College in Higher Education_ A Literature Review.pdf. *E-Proceedings v-GOGREEN2021*.
- Jaiswal, B. (2015). Fire at Cuttack's Sishu Bhawan. *The Times of India*. <https://timesofindia.indiatimes.com/city/cuttack/Fire-at-Cuttacks-Sishu-Bhawan/articleshow/49968962.cms>
- Jr, F. B. (2019). No one hurt in blaze at Brazilian hospital. *Agencia - EFE*. <https://www.efe.com/efe/english/world/no-one-hurt-in-blaze-at-brazilian-hospital/50000262-3871660>
- Kulkarni, R. S., Giri, P. A., & Gangwal, P. R. (2016). Knowledge and practices regarding fire safety amongst health care workers in tertiary care teaching hospital in Marathwada region of Maharashtra, India. *International Journal of Community Medicine and Public Health*, 3(7), 1900–1904. <https://doi.org/10.18203/2394-6040.ijcmph20162062>
- Langdon-Thomas, G. J. (1972). *Fire Safety in Buildings: Principles & Practice*. Adam & Charles Black.
- Marchant, E. W. (1972). *A Complete Guide to Fire and Buildings*. Medical and Technical Co.
- Mercy Malaysia. (2017). *Fire Fighting Requirements for a Resilient Hospital*.
- National Fire Protection Association. (2012). *NFPA 101 - LIFE SAFETY CODE* (2012 Editi). National Fire Protection Association and Fire Protection Research Foundation.
- Neufert, E., Neufert, P., & Kister, J. (2012). *Neufert Architects' Data* (4th ed.). Blackwell Publishing.
- Osunsanmi, T. O., Aigbavboa, C. O., Oke, A. E., & Eguabor, E. M. (2019). APPRAISALS OF STUDENT PERSPECTIVES ON FIRE SAFETY PRECAUTIONS IN HALL OF RESIDENCE. *14Th International Postgraduate Research Conference in the Built Environment, December*.
- Polgreen, L., & Kumar, H. (2011). 94 People Die as Private Hospital in India Burns. *The New York Times*. <https://www.nytimes.com/2011/12/10/world/india-hospital-fire-kolkata-west-bengal.html>
- Regional. (2016). Fire destroys Solomon Islands hospital. *Cook Islands News*.

- <http://www.cookislandsnews.com/item/59696-fire-destroys-solomon-islands-hospital/59696-fire-destroys-solomon-islands-hospital>
- Sandra, K., Meital, N., Ofer, M., Limor, A.-D., Sara, G., & Bruria, A. (2017). Facilitating emergency hospital evacuation through uniform discharge criteria. *American Journal of Emergency Medicine*, 35(5), 681–684. <https://doi.org/10.1016/j.ajem.2016.12.071>
- Sanni-Anibire, M. O., & Hassanain, M. A. (2015). An integrated fire safety assessment of a student housing facility. In *Structural Survey* (Vol. 33, Issues 4–5, pp. 354–371). <https://doi.org/10.1108/SS-03-2015-0017>
- Sanni-anibire, M. O., & Mohammad A, H. (2015). An integrated fire safety assessment of a student housing facility. *Structural Survey*, 33(4/5), 354–371. <https://doi.org/10.1108/SS-03-2015-0017>
- Shah, M. F., & Ahmad, N. (2016, October 25). Six dead in fire at Sultanah Aminah hospital. *The Star Online*. <https://www.thestar.com.my/news/nation/2016/10/25/fire-at-jb-hospital/>
- Şimşek, Z., & Akinciturk, N. (2015). An Evaluation of Hospital Evacuation Strategies with an Example. *International Journal of Applied Science and Technology*, 5(3), 109–121.
- Singh, S. S. (2011). 90 killed in Kolkata hospital fire. *The Hindu*. <https://www.thehindu.com/news/national/other-states/90-killed-in-kolkata-hospital-fire/article2700650.ece>
- Taaffe, K., Johnson, M., & Steinmann, D. (2006). IMPROVING HOSPITAL EVACUATION PLANNING USING SIMULATION. *Proceedings of the 2006 Winter Simulation Conference*, 509–515.
- The Star Online. (2014). Worker killed in hospital fire. *The Star Online*. <https://www.thestar.com.my/news/nation/2014/02/16/worker-killed-in-hospital-fire/>
- TNN & Agencies. (2016). Three killed, many injured in Murshidabad hospital fire. *The Times of India*. <https://timesofindia.indiatimes.com/india/Two-dead-in-Murshidabad-hospital-fire/articleshow/53885214.cms>
- UBBL. (1984). *Uniform Building By-Law 1984* (Legal Research Board (Ed.)). International Law Book Services.
- Wabo, N. C., Ortenwall, P., & Khorram-Manesh, A. (2012). Hospital evacuation; planning, assessment, performance and evaluation. *Journal of Acute Disease*, 1(1), 58–64. [https://doi.org/10.1016/S2221-6189\(13\)60013-X](https://doi.org/10.1016/S2221-6189(13)60013-X)
- Yengkhom, S. (2016, August 21). At least 3 dead in Murshidabad Medical College Fire. *The Times of India*.
- Yeturu, S. K., Annapurani, R., Janakiram, C., Joseph, J., & Pentapati, K. C. (2016). Assessment of knowledge and attitudes of fire safety – An institution based study. *Journal of Pharmaceutical Sciences and Research*, 8(11), 1281–1284.
- Zakaria, S., Ahmad, D., Abdan, K., & Rafee, M. (2019). A Case Study of Fire Safety Measures at Malaysian University Residential Colleges. *Journal of Occupational Safety and Health*, 16(2), 41–55.
- Zhong, S. (2014). *Developing an Evaluation Framework for Hospital Disaster Resilience : Tertiary Hospitals of Shandong Province , China*. Queensland University of Technology.