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MARA



# QS COLLOQUIUM 2020

## SERIES XII PROCEEDING OCT 2020 - FEB 2021

**BACHELOR OF QUANTITY SURVEYING (HONS.)**  
Department of Built Environment Studies & Technology,  
Universiti Teknologi MARA Perak

## QS COLLOQUIUM 2020 SERIES XII

UNIVERSITI TEKNOLOGI MARA (UiTM) PERAK BRANCH  
OCTOBER 2020 - FEBRUARY 2021

Perpustakaan Negara Malaysia

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ISBN: 978-967-19692-0-5

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# MEANS OF EGRESS IN HOSPITAL WARDS IN PERAK, MALAYSIA

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## **Abstract:**

Hospital building is one of the building that has a massive chance to involve in a fire incident. Efficient means of egress need to be implemented because fire incident leads to lose of lives for those who trapped inside the hospital. This paper is intended to establish an effective means of escape in hospital wards. The objectives were to (1) to assess current condition of implemented means of egress in hospital wards, (2) to identify the level of staffs and visitors' awareness towards means of egress in hospital wards and (3) to suggest the effective ways to enhance the effectiveness of means of escape in hospital wards. Three hospitals in Perak that was built before the existence of Uniform Building By-Laws 1984 (UBBL 1984) were chosen as cases study. Both quantitative and qualitative method were used in this research where questionnaires were distributed to 90 people in those three hospitals and observation were made for the assessment of the condition of implemented means of egress. All data collected were analysed using descriptive statistic. Based on the observation, all three hospitals are implementing the means of escape in accordance with the standard guidelines. The results found that the awareness upon means of egress is at a satisfactory level. However, some of the respondents still lacking of awareness in some criteria. Several ways to enhance the means of egress were also acquired through the questionnaire distributed such as displaying more fire evacuation plan and adding notes regarding the usage of fire doors in every ward.

**Keywords:** Means of Egress, Hospital Building, Passive Fire Protection, Awareness

## **1.0 INTRODUCTION**

Fire protection system is an important component of a building's safety plan regardless of whether it's a commercial facility, hospital or educational facility. Hospital building is one of the places that have high risk of fires (Djunaidi & Pratiwi, 2015). Fire protection system can be divided into two which are active and passive. As known, active fire protection system is really important towards the fire safety but, passive fire protection system also plays a big role especially the means of egress. Passive fire protection system does not need any motion to work (Ingason, 2008). Many sources of potential fire hazards exist in hospital especially the wards, ranging from the use of electrical equipment which can trigger short-circuit connection, the use of compressed gas cylinder, and the use of flammable chemicals. Usually, general hospital in Malaysia is a multi-storey building and it will be hard for the staffs, occupants and the visitors in the building to save themselves if fire incident occurred. The risk would be even greater if appropriate means of egress is not provided in the hospital. Therefore, it is crucial to ensure that all the hospital in Malaysia have an effective means of egress installed in order to protect the occupants in the building.

### **1.1 Problem Statement**

In the past, there were various incidents regarding fire outbreak happened. In 2011, fire outbreaks in AMRI Hospital in Kolkatta, India put 89 lives to an end and in 2016, Hospital Sultanah Aminah in Johor, Malaysia involved in a fire incident which caused a total of 6 deaths. Some of the leading causes of fire outbreak are human factors such as carelessness, negligence and lack of fire safety awareness (Kulkarni *et al.*, 2016). As mentioned by Jaafar and Talib, (2017) the absence of signage that shows the direction towards the refuge area could lead to problems during evacuation. Signage is one of the important factors for means of escape. According to Shastri, Raghav and Sahadev (2018) hospitals with high-tech protection systems were not competent enough in fire safety management. Some of the difficulties identified are as follows; absence of mechanized fire-fighting system, non-compliance of law enforcement, low maintenance and management of fire-fighting appliances, incompetency of hospital staff regarding safety issue, combustible materials used and stored in the building and poor accident management methodology.

### **1.2 Aim**

This study attempts to establish the effective means of egress in hospital wards.

### **1.3 Research questions**

- i. What is the current condition of means of egress in hospital wards?
- ii. What is the level of staffs and visitors' awareness towards means of egress in hospital wards?
- iii. What are the effective ways to enhance the effectiveness of means of egress in hospital wards?

#### **1.4 Research objectives**

- i. To assess the current condition of implemented means of egress in hospital wards.
- ii. To identify the level of staffs and visitors' awareness towards means of egress in hospital wards.
- iii. To suggest the effective ways to enhance the effectiveness of means of escape in hospital wards.

#### **1.5 Scope of research**

The scope of research will be focusing on the means of escape in wards and questionnaire will be distributed to staffs and visitors because the research focuses solely on those that will require to use the means escape in wards. This research is conducted in Perak. There are three hospital buildings selected which built before UBBL 1984 were established. A checklist is used to observe the effectiveness of means of escape implemented. Questionnaire survey will be used as instruments in collecting data and it will be distributed among the staffs and visitors.

### **2.0 LITERATURE REVIEW**

#### **2.1 Means of egress**

Means of egress or known as evacuation system is one of the vital components in a fire protection system. According to Şimşek and Akinciturk (2015), the function of means of escape is to provide safe evacuation for users from a hospital fire to a safe area in the shortest possible time. Jaafar and Talib (2017) added that the means of escape is needed in order to ensure a safe evacuation for all occupants in hospital's building.

#### **2.2 Occupants' awareness on means of egress**

Awareness plays a big role in the conscience of a person in deciding an action. This is applicable for the awareness on means of egress. Djunaidi and 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. This leads to a possible live loss due to the unawareness of fire outbreaks.

#### **2.3 Effective ways to enhance the effectiveness of means of egress**

Suggestion for alternative means of escape should also be considered in order to add a significant amount of fire safety during a fire incident. As for the example of alternative means of egress is the usage of facades in emergency evacuation (Romano, 2003). Another efficient evacuation that might increase the effectiveness of means of escape is the combination of moderate speed and moderate densities which concerning the combination of different escape components, such as stairs and evacuation elevator (Ronchi & Nilsson, 2013).

### **3.0 METHODOLOGY**

This study adopted qualitative and quantitative method. Qualitative research involves purposeful use for describing, explaining, and interpreting collected data. Quantitative method is a procedure that being approached which the main characteristic of this particular method is the data can be quantify. This method involves a numeric or statistical approach to research design. Method of observation has been chosen for the qualitative method in order to get the primary data. Checklist is used to ensure that there will be no mistakes while making observation. The checklist will be made based on the guidelines in Malaysia which are National Fire Protection Association (NFPA) 101, UBBL 1984, and Fire and Rescue Department of Malaysia (FRDM)

For quantitative method, Questionnaire is used as research tool for obtaining data about the occupant's awareness on means of escape provided in hospital wards. Simple random sampling technique is used to select the respondent where a total of 90 questionnaires will be distributed to 30 respondents for each. The Likert scale format will be used for this. The data collected from the questionnaire will be analysed by using the statistical package for social science (SPSS latest version 25.0) using descriptive analysis to obtained the mean and frequency of all the variables in the questionnaire.

### **4.0 ANALYSIS AND FINDINGS**

#### **4.1 The current condition of implemented means of egress in hospital wards**

Table 1 shows the attributes from the observation were all checked available except for some of the attributes such as the staircases and horizontal exits and left out since Hospital A and C are landed building. All three hospitals are implementing the means of escape in accordance with the standard guidelines made available which are UBBL 1984, NFPA101, and FRDM despite all the three hospitals were built before the existence of such guidelines.

Table 1. Observation Checklist

DESIGN CRITERIA FOR MEANS OF EGRESS			Hospital A	Hospital B	Hospital C
Attributes	Ref	Design Criteria			
Exits	UBBL 1984 : 166	To be accessible at all times	/	/	/
		NFPA 101 : 7.10.1.2.1	Clearly are identifiable as exits	/	/
		Marked by an approved sign that is readily visible	/	/	/
Horizontal exits	UBBL 1984 : 171	Are provided protected staircases	X	/	X
		Final exits need only be of a width to accommodate the occupancy load of the larger compartment or building discharging into it	X	/	X

Table 1a. Observation Checklist

DESIGN CRITERIA FOR MEANS OF EGRESS			Hospital A	Hospital B	Hospital C
Attributes	Ref	Design Criteria			
Exit doors	NFPA 101: 7.2.1.4.1	Side hinged or pivoted-swinging type	/	/	/
		Capable of swinging from any position to the full required width of opening	/	/	/
	NFPA 101: 7.2.1.5.1	Door leaves shall be arranged to be opened readily from the egress side	/	/	/
	UBBL 1984 : 173	Shall be openable from the inside without the any key or any special knowledge or effort.	/	/	/
	UBBL 1984 : 173	Shall close automatically when released	/	/	/
Signage	NFPA 101: 7.10.2.1	With a directional indicator showing the direction of travel	/	/	/
		Placed in every location where the direction of travel to reach the nearest exit is not apparent	/	/	/
	UBBL 1984 : 172	For storey exits and access to such exits shall be marked by readily visible signs	X	/	X
		For storey exits and access shall not be obscured	X	/	X
FRDM	Staircase identification is required	X	/	X	
Fire Escape plan	FRDM	Provided for all buildings.	/	/	/
		Clearly visible,	/	/	/
		Clear with legible lettering and the fire escape route made clear to the readers.	/	/	/
		Clearly show the layout of the floor in the correct building orientation and highlight the escape routes	/	/	/
		Using appropriate colors, directional signs and words.	/	/	/

Note: / available, X unavailable

#### 4.2 Awareness of visitors and staffs towards the means of egress in hospital wards

Table 2 shows most of the respondents aware about the means of escape in the hospital. More than 90% of the respondents answered aware and strongly aware regarding questions about the awareness of means of escape. However, for questions regarding fire exit doors, there are still some of the respondents answered partially aware. The respondents were asked whether they know that there is duty of people who have specific responsibilities in the event of fire and there are two of the respondents answered uncertain. The outcome is probably due to the unawareness of the responsible staff which is the floor warden stated in each floor or certain appointed area.

**Table 2.** Descriptive Statistics of Awareness of Means of Egress

Questions	N	Frequency of analysis					Mean
		1	2	3	4	5	
Do you know the existence of means of escape for fire outbreak in this hospital?	90	0	0	1	21	68	4.74
Do you know the location of escape routes during fire outbreak?	90	0	0	3	24	63	4.67

**Table 2a.** Descriptive Statistics of Awareness of Means of Egress

Questions	N	Frequency of analysis					Mean
		1	2	3	4	5	
Do you know the existence of fire evacuation plan?	90	0	0	2	20	68	4.73
Do you know the where is the refuge area?	90	0	0	3	21	66	4.70
Do you know that using staircase is much safer instead of using lifts?	90	0	0	0	17	73	4.81
Do you know the operation of fire exit doors?	90	0	3	5	19	63	4.58
Do you know the importance of keeping fire doors closed?	90	0	2	5	18	65	4.62
Do you know how people will be warned if a fire is discovered?	90	0	0	2	18	70	4.76
Do you know that there is duty of people who have specific responsibilities in the event of a fire?	90	0	2	0	17	71	4.74

Note: 5 strongly aware, 4 aware, 3 partially aware, 2 uncertain, 1 unaware

### 4.3 Weaknesses of implemented means of egress

Table 3 shows that overall, the respondents were all agreed that all the attributes are in good conditions. However, more than 95% of the respondents answered that the fire exit doors are being abused as normal. This is very unacceptable as the main purpose of the fire door is to compartmentalize the fire and stop flames and smoke spreading from one section to another section and act as means of egress during fire outbreaks.

**Table 3.** Weaknesses of Implemented Means of Egress

Questions	N	Frequency of analysis					Mean
		1	2	3	4	5	
Do you think the signage for means of escape is well displayed?	90	0	0	0	20	70	4.78
Do you think the fire escape plan is well displayed?	90	0	0	0	20	70	4.78
Do you think the escape route such as corridors and stairs are clear of obstruction?	90	0	1	1	17	71	4.76
Does the fire door being abused as normal door?	90	0	1	2	19	68	4.71
Do you think that the refuge area is adequate enough?	90	0	0	0	18	72	4.80

Note: 5 strongly agree, 4 agree, 3 partially agree, 2 uncertain, 1 disagree

**4.4 Enhancement towards means of egress**

Table 4 indicates the variable of effective ways that can be suggested to enhance the effectiveness of means of escape in hospital wards so that any unwanted incidents during fire outbreak such as trapped inside the building can be avoided.

**Table 4.** Enhancement Towards Means of Egress

Statements	N	Frequency of analysis					Mean
		1	2	3	4	5	
More signage for the fire escape should be displayed.	90	0	0	0	14	76	4.84
Fire exit door must be assessed for its functionality from time to time.	90	0	0	0	15	75	4.83
Escape routes shall be well maintained to avoid any slippery.	90	0	0	0	14	76	4.84
Escape route shall be clear of any obstruction such as trolleys and beds.	90	0	0	0	16	74	4.82
Fire evacuation plan shall be displayed more and visible.	90	0	0	0	15	75	4.83

Note. 5 strongly agree, 4 agree, 3 partially agree, 2 uncertain, 1 disagree

**5.0 CONCLUSION**

In a nutshell, all three hospitals implementing means of egress in accordance with standard guidelines available. Aside from that, general matters regarding means of egress are known and aware by most of the respondents. In terms of weaknesses, the result is still at satisfactory level. However, only one variable is at a worrying level which is the abuse of fire door. Such manner might lead to loss of lives during fire outbreaks. Enhancement of means of egress also can be implemented by particulars parties involved in order to increase the effectiveness of means of egress.

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