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Critical Components Contributing to Disaster Resilience Hospitals

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ABSTRACT

The issues of hospital disaster resilience have been discussed for more than 30 years across the globe and gaining its prominence in recent years, yet it remains poorly defined. The inappropriate choice of components for disaster resilience hospitals will contribute to disruption and cause the hospital vulnerable towards disasters. Hence, the objective of the paper is to identify critical components of disaster resilience hospital. Qualitative research techniques were employed in the form of document analysis (i.e. guidelines and manuals from international public health agencies) and focus group among public agencies (i.e. MERCY Malaysia; hospital emergency physicians; and academicians). The findings revealed that three (3) critical components contributing to disaster resilience hospitals are: structural; non-structural and functional. The results of the study could offer valuable guideline for public hospitals in reducing the vulnerability to any types of disaster.

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INTRODUCTION

Health facilities whether hospitals or rural health clinics, should be a source of strength during emergencies and disasters. Hospitals infrastructure should be ready to save lives and to continue providing essential health services such as laboratories, medicines, treatment and rehabilitation (WPRO 2008). In spite of its importance to the community, health facilities are themselves vulnerable to disasters and can get damaged by which risking the lives of patients and health workers (WHO, 2010). With regards to the notion, the community is inevitable to establish the hospital disaster resilient. The concept of resilience can encompass the potentials that enable the individual, organisation or community to resist, respond to and recover from the impact of disasters (Paturas, 2010; Albanese, 2008; Braun, 2006; Bruneau, 2003). A safe and resilient hospitals are those that provide services efficiently, structurally strong, organized with contingency plans, and continue to function at maximum capacity during disasters (WPRO, 2008; UNISDR, 2010).

Problem Statement:

Eventually, hospitals were vulnerable when struck by large scale natural disasters, whereby the

services are interrupted temporarily or permanently, mainly due to the damages to its infrastructure ((PAHO, 2004). Thus, disaster resilience hospitals should be incorporated with structural components; non-structural components; emergency medical functions; and disaster management capacity (Veterans Health Administration, 2008). However, inappropriate choice of components will contribute to disruption of critical functions and cause the hospital to be vulnerable towards disasters (Achour, 2014). In Malaysia, the health facilities are vulnerable towards various types of disasters (i.e. natural and man-made). For instance in 2009, Putrajaya Hospital's roof was caught on fire due to lightning (Tiong-Lai, 2009), in 2013 three clinics in Kemaman were severely damaged due to flood occurrence (Ministry of Health Malaysia, 2013) and in 2014, Sarawak General Hospital was caught on fire (Yusof, 2014). Hence, the objective of this paper is to identify critical components (structural; non-structural and functional) influencing the capability of hospitals to achieve disaster resilience in Malaysia.

Methodology:

Qualitative research techniques were employed in the form of document analysis and focus group approach. The initial method of data collection was by means of document analysis on various guidelines

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and manuals from international public health agencies (i.e. WHO; WPRO; PAHO; SEARO; and EURO). Another method for the data collection was through focus group approach with five (5) selected respondents. The purpose of focus group approach is to reinforce the earlier findings by interpreting data

from guidelines and manuals. The discussions were recorded and transcribed verbatim for content analysis. Table 1 provides the information on the respondents that were involved in the focus group approach.

Table 1: Respondents' Background.

	Organisation	Designation	Years of Experience
R1	MERCY Malaysia	Head of Technical Team	25
R2	Permaisuri Bainun Hospital	Emergency Physician	6
R3	Kuala Kubu Baru Hospital	Emergency Physician	5
R4	Faculty of Health Science, UiTM	Academician	31
R5	Faculty of Civil Engineering, UiTM	Academician	21

Findings:

(i) Document Analysis:

Table 2 shows seven (7) components that influence the capability of existing hospitals in achieving disaster resilience based on the document analysis from eight (8) guidelines and manuals. These are: structural; non-structural; functional; geographic location; human resources; administration / organization; and emergency preparedness plan.

Among others, three (3) components are asserted as utmost critical which are structural; non-structural and functional. It is due to the fact that the other components (i.e., human resources; administration / organization; geographic location; and emergency preparedness plan) were already incorporated within the three critical components.

Table 2: Document Analysis of eight guidelines and manual from international public health agencies.

ITEM	PAHO-G [15]	SEARO-G [16]	EURO-G [17]	WPRO-M [18]	SEARO-G [19]	PAHO-G [20]	WPRO-G [1]	WHO-G [2]
COMPONENTS								
• Structural	v	v	v	v		v	v	v
• Non-Structural	v	v	v	v	v	v	v	v
• Functional				v		v	v	v
• Geographic Location			v	v		v		v
• Human Resources				v			v	v
• Administration / Organization	v		v			v	v	
• Emergency Preparedness Plan		v		v		v	v	v
PURPOSE	Evaluate hospital safety from disasters through structural, non structural and administration / organization aspects	Indicates non-structural mitigation measures for hospital safety from earthquakes	Evaluate the possible weak elements in health facility and main aspects of vulnerability	Evaluate the preparedness of health facilities in dealing with disasters	Indicates non-structural mitigation measures for hospital safety from earthquakes	Evaluate hospital safety from disasters	Assess hospital structural, non-structural and functional vulnerabilities	Assess hospital structural, non-structural and functional vulnerabilities

*G – Representing Guidelines

*M – Representing Manuals

Sources: PAHO (2000); SEARO (2004); EURO (2006); WPRO (2006); SEARO (2008); PAHO (1996); WPRO (2008) and WHO (2010)

Table 3: Result of Focus Group Discussion.

Definition and Components of Disaster Resilience Hospital	
R1	The disaster resilience hospital should has the capability to protect their <i>structural</i> and <i>non-structural</i> element through its <i>functional</i> capacity such as <i>emergency planning system</i> (i.e. nursing call system) and <i>community management</i> (i.e. staff and patient)
R2	Disaster resilience hospital is the hospital's capability to respond from any type of disasters by incorporating its <i>functional</i> element via <i>emergency management system</i> .
R3	Disaster resilience hospital integrates the management of its <i>physical</i> aspect, <i>non-structural</i> , hospital <i>emergency system</i> and the <i>human resources</i> in order for the hospital to continue functioning during disaster occurrences.
R4	Disaster resilience hospital is the ability to minimise any disruption in hospital operation during the occurrences of any types of disasters and it can be achieved by providing <i>contingency planning</i> and <i>training</i> to the hospital organisation.
R5	Disaster resilience hospital is the ability of the organization to contain the effects of disasters through strengthening its <i>structure</i> particularly in <i>seismic code of practice</i>

Focus Group:

Table 3 presents the definitions of the disaster resilience hospital concept and its key components. It was found that the components mentioned earlier (i.e. structural; non-structural; and functional), have been asserted by all the respondents as the critical components to be implemented by public hospitals in Malaysia.

Based on the results, R1 and R3 agreed that disaster resilience hospital should be equipped with a structure that could resist and withstand the shock of any type of disasters (i.e., internal and external disaster). It is supported by the statement of R5 that emphasised on “*seismic code of practice*”. This is due to the fact that almost all public buildings particularly hospitals in Malaysia are designed based on BS 8110 in which no provision of seismic code of practice is included. Hence, it is recommended that the seismic code of practice should be incorporated for future design. This is in line with Achour *et al* (2014), that emphasized hospitals’ stakeholders should ensure their healthcare facilities to be well covered by resilience codes and legislations.

Apart from the structural component, R1 and R3 emphasized that the non-structural components should also be embedded in the public hospitals’ policies and guidelines. R3 highlighted that “*non-structural components such as electricity and water resources should also be ponder upon particularly in existing public hospitals during disasters*”. It has been postulated by Peters (1993), that loss of non-structural components such as portable water, electric and telecommunication will reduce the hospitals’ resilience.

Furthermore, R1, R2, R3 and R4 indicated that another component worth to consider is functional components. It is highlighted that “*functional component can be incorporated via emergency management system that involves the activation and management of various sections such as command centre and operation*”. It has been verified by Zhong *et al* (2014) that emergency management mechanism is one of the critical components that guarantee the hospital continuity and surging during disasters. Whilst, R4 ascertained that “*disaster resilience hospital can be sustained through training and awareness program to their hospitals’ staff*”. This statement corroborates with the idea of Paton and Allen (2013) who indicated that training and simulations provide opportunities for the individuals to review plans, develop technical and management skills between the hospitals’ staff.

Hence, the findings revealed that a disaster resilience hospital is the hospital capabilities to protect, respond, and minimise any disruption from the effects of internal and external disasters to make it to function entirely. Moreover, three (3) utmost critical components which are structural; non-structural and functional have been addressed by the

respondents as influencing the capability of hospitals in achieving disaster resilience.

Summary:

This paper has presented the findings on the definitions and components of disaster resilience hospital. Three components (i.e., structural; non-structural and functional) have been addressed as the utmost critical components. It has been proven through document analysis and focus group approach. The result of the study could offer as valuable guideline for public hospitals in reducing the vulnerability to any types of disasters by incorporating those components earlier. The details of the components for disaster resilience hospitals will be reported in the next research.

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