A Conceptual Study on Criteria and Indicators of Preparedness Towards Disaster for Emergency Medical Response

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SUMMARY

Malaysia is considered very lucky. When her neighboring countries like Indonesia, Phillipines and Taiwan are prone to earthquake, typhoon, flash flood or volcano eruption, so far Malaysia by at large has been spared. Though Malaysia faces monsoon season and consequently heavy rain and flood on annual basis, the scale of such disaster is always manageable. The tragedies of the Highland Towers in 1994, worst flood season of 2014 and most recently the earthquake and tremors in Sabah 2015 change that perception. Malaysians generally, first responders and decision makers are caught by surprise. It is indeed impossible to predict when and where a disaster either natural or man-made will occur. Thus, it is imperative to be on guard and prepared at all times so the society at large knows what to do and how to behave during a disaster. Education is seen as the most suitable platform in educating and preparing the first responders and society towards disaster, resilience building, rescue and recovery efforts respectively. The study investigates the level of preparedness amongst first responders in facing disaster. This is done by developing a measuring instrument to benchmark their preparedness at organization, unit and personal levels. There are three criteria of preparedness for first responders namely ‘able’, ‘willing’, and ‘ready’. Results of the study demonstrate ten indicators of preparedness. The study adopts quantitative approach. The criteria and indicators of preparedness where determined based on literature review, policy documents, law provisions and preliminary study. The findings of the study could be used as guidelines for education providers on the possible educational and training programs in the future.
1. INTRODUCTION
The United Nations Secretariat of the International Strategy for Disaster Reduction and the United Nations Office for Coordination of Humanitarian Affairs (2008) defined preparedness as the capacities and knowledge developed by governments, professional response organizations, communities and individuals to anticipate and respond effectively to the impact of likely, imminent or current hazard events or conditions. Historically the concept of preparedness was first introduced by Leonard Wood and his colleagues in 1915 for military purposes (Votaw, 2013). Then it was expanded and adapted by civil security in 1970s (Hemond and Robert, 2012) as the key concept in disaster management and planning (Kirschembaum, 2002; Sutton and Tierney, 2005; Slepski, 2007; Hémond and Robert, 2012). It was intended to be part of a continuous process in disaster management cycle (Hemond and Robert, 2012; Government of Malaysia, 2012; Harris, 2013).

This concept continues to evolve (Mays et al., 2013) especially after the introduction of Hyogo Framework for Action (HFA) 2005 – 2015 (Hemond and Robert, 2012). The HFA is a 10 years plan to make the world safer from natural hazards. It was endorsed by the UN General Assembly in the Resolution A/RES/60/195 following the 2005 World Disaster Reduction Conference as one of the crucial actions in promoting resilience nations and communities to disasters (International Strategy for Disaster Reduction, 2007). All parties, mainly the response agencies are encouraged to strengthen their preparation before the eventuality (International Strategy for Disaster Reduction, 2007). Education has been identified as the best mode to introduce, develop, train and inculcate the culture of preparedness. Naturally first responders who are trained on disaster preparedness understand and provide better proactive and pre-emptive actions when the disaster strikes.

2. PROBLEM STATEMENT
Conducting professional education program on disaster management generally or preparedness programs specifically is easier said than done. Ultimately it requires specific curricula mapping to produce well-prepared responders. It is crucial for program coordinators to benchmark criteria of prepared responders so that all the programs conducted are achievable and practical. There are indeed few examples of failed programs that did not achieved the targeted objectives. For instance, the World Health Organization (WHO) and the International Council of Nurses (ICN) have introduced a set of competencies of disaster preparedness for nursing program (WHO and ICN, 2009). Program coordinators are encouraged to integrate the new competencies into their curricula (Pang et al., 2009). However, the outcome is less impressive. Zhang (2009), According to Usher and Mayner
(2011) there are missing links in the integration activities, resulting in producing ill-equipped nurses and in turn not up to par performances in disaster response exercises.

Although competency is crucial, it is not the only criterion of preparedness (McCabe et al., 2010). In order to be a prepared responder McCabe et al. (2010) believe an individual must be willing and have adequate resources. This study tries to close the above gap by investigating criteria and indicators of preparedness towards disaster situation. It specifically focuses on healthcare personnel (HP) as the first responders in radiation emergency as the category of disaster.

This article is divided into several sections. Section one serves as general introduction, followed by Section two, which discusses on the background of ‘Ready, Willing and Able’ (RWA) criteria of preparedness. They serve as the foundation in developing the indicators of each RWA components. Section three will articulate the methodology of study. Section four and five are the findings and discussions respectively. Section six puts forward few recommendations.

3. READY, WILLING, AND ABLE: CRITERIA OF PREPARED RESPONDERS

Work performance theory by Blumberg and Pringle (1982) shows capacity, willingness, and opportunities to work are the three crucial determinants of performance (Figure 1). These three interaction factors must work closely together in enabling an individual to function and subsequently increase his performance at work. Capacity to work refers to the physiological and cognitive capabilities that enable an individual to perform a task effectively (Blumberg and Pringle, 1982). It could be represented by the effect of individual’s ability, intelligence, age, state of health, level of education, endurance, stamina, energy level, motor skills, and similar variables. Will, is the psychological and affective characteristics that influence the degree to which an individual is inclined to perform a task (Blumberg and Pringle, 1982). Opportunity on the other hand refers to environmental factors beyond the employee’s direct control in influencing his or her performance. These include, but not limited to the availability of tools, equipment, materials, organizational policies, rules, and pay.

In the context of public health and disaster preparedness, the Ready, Willing, and Able framework by McCabe et al. (2010) is in line with Blumberg and Pringle (1982). McCabe’s RWA framework intends to improve the preparedness amongst individual or organization in responding to possible catastrophes and public health emergencies. The framework could be adapted in any response agencies. The RWA framework consists of three equal-sized circles almost similar to the diagrams of Work Performance theory as shown in Figure 1. Each circle represents ‘ready’, ‘willing’ and ‘able’. When an individual or organization satisfies all the constructs, he is regarded to have a high level or quality of preparedness
3.1 READINESS (R)
Readiness refers to the support the HP has or received in the form of opportunities in order to perform well in emergency medical response operation (McCabe et al., 2010). Here, opportunity refers to environmental or surrounding factors beyond the personnel’s direct control which may influence his readiness in discharging his duties. The influences could come from the organization, department, individual, and family respectively (McGongle et al., 2005).

3.2 WILLINGNESS (W)
Willingness is defined as the tendency of HP to participate in emergency medical response operation enthusiastically (McCabe et al., 2010). The willingness is reflected by personnel’s anxiety towards radiation emergency. In other words, the willingness of personnel to respond and render assistance in a disaster depends essentially on his personal perceptions on the risk associated with radiation emergency, as well as perception on capability to react in the emergency.

3.3 ABILITY (A)
Ability refers to physiological and cognitive capabilities of HP to perform certain task of specific requirements competent (McCabe et al., 2010). Where Malaysia is concerned and according to a report on public health preparedness and response competency model by Centers for Disease Control and Prevention (CDC), a HP must have four spheres of competency. These include leadership, communication and management of information, planning, and protection on safety and health (CDC, 2012).

4. METHODOLOGY
In exploring each criterion of RWA, qualitative method is considered and adopted as the most suitable approach. The researchers firstly analyzed all relevant national policies on disaster, emergency medical response plans for responders, government documents, previous research,
published journal papers or books and interviewed subject matter experts. Their inputs are used as basis in constructing the criteria and indicators of prepared healthcare personnel.

5. FINDINGS
Readiness at organizational level would essentially reflect the readiness of EMS to respond to radiation emergency (McCabe et al., 2010). Likewise the performance of HP either as an individual or a group contributed to the success of medical emergency response.

5.1 READINESS TO RESPOND TO RADIATION EMERGENCY
There are several groups of people that could influence HP’s degree of performance such as at organizational, department, individual and personal-familyp levels as described below.

5.1.a ORGANIZATIONAL READINESS
In Malaysia, there are only selected few hospitals endorsed to be the forerunner and provide EMS for victims who are contaminated by, or exposed to radioactive material (CDC, 2012). These hospitals must organize their human and material resources in order to support particular departments when radiation emergency strikes as well as managing victims with general injuries. They must have (i) specific and comprehensive medical emergency response plan towards possible radiation emergency, (ii) adequate number of personnel, (iii) accessible, working if not latest equipment and tools, (iv) budget for training and development purposes and (v) communicate with other departments of the above mentioned so they too would know the capabilities and facilities of the hospitals.

5.1.b READINESS AT DEPARTMENT LEVEL
During an emergency, nearly all departments of the hospitals are involved in medical emergency response operation. Usually the services and assistance of Trauma and Emergency Department are highly most sought after (Ministry of Health Malaysia, 2012). Hospitals must have adequate human and material resources at organization and departmental levels at all times and particularly during emergency. For example, hospitals must have a standard operating procedure and well-functioning equipment so the departments and HP could discharge their specific duties well.

5.1.c READINESS AT INDIVIDUAL LEVEL
At individual level, the focus is on HP who works in the Trauma and Emergency Department namely emergency doctors, medical assistances, nurses and hospital attendances. If radiation emergency strikes, they have to rescue victims at the site of incidents and in hospitals. Expectantly, they must be ready at all times physically and mentally. In assessing their preparedness, this part of study focuses only on the physical and material aspects of support such as personal health status, monetary, transportation, and types of training and developmental programs attended and purposely left out the mental or emotional aspects like behavior, personal and emotional factors.

5.1.d FAMILY READINESS
Although family members of HP are not directly involved in EMS operation, nonetheless their personal and emotional supports are crucial to the HP personally. The very nature of HP’s work
demands them to be ready, able and willing to leave their family members and dependent at any time. It is essential for the family members to be equally ready, mentally prepared and accepted the above facts. In view of this the HP and their dependents must have some contingency plans in preparing themselves when radiation emergency strikes. For instance, family members are expected to have adequate water, food and electricity supply. It is to ensure they could continue their daily activities without difficulties. If necessary the personnel is supposed to call upon trusted individual to look after his family and keep them safe. Logically, a HP could not have a peace of mind and focus on his works until he knows that the welfare of his family is taken care of.

5.2 WILLINGNESS TO RESPOND TO RADIATION EMERGENCY
There are two contributing factors to willingness to respond to radiation emergency. They are perception on the risk associated with radiation emergency, as well as perception on capability to react in the emergency as discussed below.

5.2.a PERCEPTION TOWARDS RADIATION EMERGENCY RISK
Perception on risk may vary between countries and even amongst individual (Zwart et al., 2009). Their concerns are mostly on the risk of radiation towards their health and family members, lack of knowledge and skills to provide response and inadequate personal protective equipment. Because of that, some personnel could perform well in medical emergency response, while some could not. Thus, it is salient for all HP to have and share a common understanding on the risk of radiation emergency. It is to minimize their varying perceptions so they could discharge their duties at equivalent level professionally.

5.2.b PERCEPTION TOWARDS PERSONAL CAPABILITY
By right, each HP must personally have a sense of capability both on and off duties. Their capabilities include providing treatment to patients with varying health conditions, localities and stratum according to response plan established by department. They must be able to report for duty whenever the call comes considering the Trauma and Emergency Department is responsible to provide EMS at any time, day or place. At this point, support by their families and close friends is significant in motivating them to render their services to those in needs. Such supports may even expand to include emotional encouragement by colleagues at workplace within or outside the departments and organizations.

5.3 ABILITY TO RESPOND TO RADIATION EMERGENCY
The indicators for ability of HP to respond to radiation emergency are extracted from the Medical Emergency Response Plan by Kuala Lumpur Hospital (KLH). KLH acts as the National Radiation Treatment Centre (Kuala Lumpur Hospital, 2011). The KLH’s emergency response plan document is indeed in line with the response competency model developed by Centers for Disease Control and Prevention (CDC), a leading national public health institute of the United States whose functions amongst others is to ensure the state and local public health systems are prepared for public health incidents. Both spoke about abilities of HP in four different contexts.

5.3.a LEADERSHIP

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Leadership is essential especially during emergency or disaster. Personnel with leadership traits permit others to select, train, support, influent and motivate each other towards achieving organizational mission and objectives (Winston and Patterson, 2006). A proactive leader should possess certain traits, measurable by looking at his abilities to solve problem, control of emotions, team work, empathy, knowledgeable and adaptability.

5.3.b COMMUNICATION
Communication during emergency response operation is particularly complex (Slade et al., 2008). HP usually works under stress in different teams, departments, organizations with varying ranks where communication happens in series chain of commands. HP must to be able communicate and pass the correct information accurately and effectively so immediate medical treatment could be provided without delay as part treatment to contain and control the effect of radiation onto victims. For effective communication, HP must have the ability to receive, deliver and report information.

5.3.c PLAN AND IMPROVE PRACTICE
Ideally a HP either as an individual or team member should participate in strategic planning for medical emergency response operation to increase their understanding of the organization’s objectives, missions and strategic targets better and give them some sense of purposes (Kohtamaki et al., 2012). They can participate either in designing and developing the medical emergency response operation plan or in making the implementation plan for such response plan.

5.3.d Protection on Worker Safety and Health
During a disaster, it is utmost important for the HP to rescue and save victims at the hazardous site of radiation emergency and at hospitals (Kuala Lumpur Hospital, 2011; Government of Malaysia, 2012). At the same time they must ensure that they are protected at all time too. If not there is always a high probability that they would be inadvertently exposed to hazardous material such as radioactive material, chemical, and physical hazards (McCabe et al., 2010). In this context, the proposed RWA criteria would look at several competencies like use of protective equipment, knowledge on related law and regulations, handling of decontamination process, and reporting unresolved safety and health crisis.

6. DISCUSSION
This study identified ten indicators for the RWA criteria of preparedness. They are namely (1) organizational readiness; (2) department readiness; (3) individual readiness; (4) family readiness; (5) perception towards radiation emergency risk; (6) perception towards personal capability; (7) leadership; (8) communication; (9) plan and improve practice; and (10) protection on worker safety and health. In order to determine which amongst these criteria is more important than the others (Saaty, 2008; Nor Ashikin and Siti Hasliah, 2012), researchers have conducted a Analytical Hierarchy Process (AHP), a multi-attribute decision making process. Several subject matter experts are invited to give their judgment on the importance of each indicator over the others. The researchers can then translate their judgments into a system of hierarchy of priority or importance (Saaty, 2008; Nor Ashikin and Siti Hasliah, 2012). Once the above is done, disaster management programs coordinators could develop appropriate training programs.
7. CONCLUSION AND RECOMMENDATION

It is important for education and training programs to tailor fit the requirements and needs of the targeted groups. The proposed RWA scale instrument could satisfy that needs. Likewise the curricula of such programs would be more meaningful and useful if they are research based so it would indeed offer better guidance and tackle whatever gaps, if any. The same would bring credibility and practically to the HP as attendees or participants. The training programs would also serve as a platform for HP to inform their superiors of their concerns so that programs could be designed for their better improvement.

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SUMMARY

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