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## The Effect of Nurse Led Disaster Drill Training on Knowledge and Practice of Disaster Management among Registered Nurses at Private Hospital

Azida Semail, Aini Ahmad, Azimah Masri & Nooratikah Cholan

<sup>a</sup>KPJ Puteri Specialist Hospital, Johor Bharu, Malaysia, <sup>b</sup>School of Nursing, KPJ Healthcare, University College Malaysia, <sup>c</sup>School of Nursing, KPJ Healthcare, University College Malaysia, <sup>d</sup>KPJ Puteri Specialist Hospital, Johor Bahru, Malaysia

### Abstract

Disaster drill training is an important part of training to all nurses in order to prepare nurses to function effectively during real disaster. Nurses should understand the importance of disaster nursing will make them enables to take part in the stages of the process effectively related to disaster management. This study aims to assess the current status and identify nurses' knowledge and practice for disaster drill training and how they acquired their knowledge about disaster preparation in KPJ Puteri Specialist Hospital. Quasi Experimental study was conducted in this study with one control group pre-test and post-test design. The sample collected by using stratified purposive sampling among registered nurses. The pre and post questionnaires were used for data collection. The target population and sample for this study is Registered Nurses working in KPJ Puteri Specialist Hospital. Target population and sample involved multidiscipline in KPJ Puteri Specialist Hospital Johor Bahru. The completed questionnaires were analyzed from demographic data, knowledge, nursing practices which are significant for this study by using Microsoft Excel and Statistical Package for Social Science (SPSS) version 25.0. The analyzed data used to present the results. The age mean score of the participant was 29.65 (S.D : 4.68), and the years of services mean score was 6.23 (S.D : 3.109). Most of the participant are from special care nursery. In the Knowledge part, pre-test with mean score was 52.63 (S.D : 7.735) and for posttest was 55.00 (S.D : 5.835). While the practices part, pre-test with mean score was 21.50 (S.D : 3.755) and the mean score for posttest was 22.88 (S.D : 2.729). The result for correlation for knowledge and practice was  $r = 0.674$ , which is large degree of correlation and  $p$  value is significant which is less than 0.05. The result for t-test was  $t(39) = 33.380$ ,  $p < 0.05$  The data from the research study demonstrate an increasing and compliance result related to knowledge and practice among registered nurses on disaster drill training.

**Keywords:** Disaster Drill, Training, Knowledge, Practice, Nurses.

### Introduction

Malaysia has experienced 51 natural disasters in the past two decades (1998-August 2018). During that period, 281 people died, over 3 million people were affected, and disasters caused

nearly RM8 billion in damage. Malaysia has several defenseless groups including children, the poor and the displaced. The country also faces possible threats to population health and development due to climate change. These impacts can affect ecosystem disruption, food production, water supply, outbreaks of infectious diseases and vector-borne diseases. Hence, Malaysia has integrated multiple strategies economic and civil advances outlined in the Eleventh Malaysia Plan 2016-2020. As reported in the Disaster Management Handbook (2019), Malaysia Natural Hazard and Exposure Risk score was 3.4/10 for year 2019. In addition, between July 2012 and January 2019, Malaysia had the highest percentage of population exposed to flooding among ASEAN member states. Natural disasters have been increasing worldwide from year to year (Anis et al., 2016)

Lately, Malaysia has experienced floods, chemical pollution and some natural disasters. In the east coast region of Malaysia, which includes Kelantan, Terengganu and Pahang, a flood disaster occurred in 2014, which was cited as the most damaging disaster affecting the community the most compared to previous years (Nurumal et al., 2017). With the growing frequency of disaster events around the world, the need to prepare for education and training needs to be emphasized. A study reported that, a set of core competencies has also been defined as a starting point for delineating the expected competency of healthcare professionals in disaster medicine and public health (Walsh et al., 2012).

Nurses of all specialties should be equipped with all competencies for disaster prevention, preparedness, response and recovery phases. It is noted that disaster simulation has been used as an educational strategy to prepare nursing students for disaster response and has been incorporated into the undergraduate nursing curriculum (Kaplan et al., 2012). Emergency nurses are the first line of care when healthcare facilities face disasters and catastrophic conditions, and these medical professionals are instrumental in limiting the worsening of such conditions (Li et al., 2012)

The National Student Nurses Association in the United States mentioned that all nursing schools include disaster nursing training and preparedness in their courses by 2003. Nursing skills can be refined by regularly exposing nurses to mock and simulated exercises, and examining nurses' competencies and ability to apply their knowledge in real-life situations. The World Health Organization (WHO) recommended in 2015 that all health sectors improve the knowledge and skills of medical professionals in civil protection in order to reduce risks and improve emergency preparedness and response.

Disaster drill training was conducted every year in KPJ Puteri Specialist Hospital Johor Bahru, however till present there is still no specific study done to assess the effect of the program and to measure nurses' knowledge and practice regarding the effectiveness for the program. For that reason, the researcher needs to conduct the study, to assess, identify the knowledge and practice of disaster drill among RNs and to plan the appropriate and relevant intervention towards the effectiveness of disaster drill in KPJ Puteri Specialist Hospital Johor Bahru.

### *Background*

Malaysia faces potential dangers to population health and growth due to climate change. For example, societies living in seaside regions are at risk of flooding due to rising sea levels.

Increased temperatures and changes in precipitation patterns can lead to increases in malaria, cholera and dengue, as well as heat stress. Furthermore, many climate hazards and extreme weather events such as heat waves, heavy rain and droughts as well as inland floods could become more frequent and intense as a result of climate change. Flooding due to climate change could cause more drowning deaths and have indirect impacts. These impacts can affect food production, water supply, ecosystem disruption, outbreaks of infectious diseases and vector-borne diseases.

Disaster nursing began with Florence Nightingale (the founder of nursing science) during the Crimean War. She used environmental resources to treat victims and was the first health worker to activate a triage system by sorting patients according to their needs (Simon & Teperman, 2001). When the disaster strikes, healthcare professionals are often among the first people to respond to the situation. Therefore, disaster preparedness training for all health professionals is essential to maintain an efficient health care system in the midst of a disaster, especially given the potentially widespread nature and complex atmosphere of these types of incidents (Chapman et al., 2008).

In this study setting, mainly focusing on the effectiveness of disaster drills on the nurses as they are one of the important parts in handling any disaster happened in a hospital. As one of the largest groups of healthcare providers, nurses play a crucial and significant role in all aspects of healthcare for patients and their families. Disaster management aims to lessen or prevent any potential losses from hazards and dangers, so that appropriate aid can be delivered to disaster victims, and achieve rapid recovery efficiently.

The goal of emergency preparedness programs is to achieve a satisfactory level of preparedness to respond to any emergency situation through programs that strengthen the technical and managerial capacities of governments, organizations and communities. Preparedness measures include preparedness plans; emergency drills or training; warning systems; emergency communication systems; evacuation plans and training; resource directories; emergency personnel or contact lists; mutual aid agreements; and public information or education. Disaster planning is one of the most vital core capabilities of caregivers who need to be equipped with the essential knowledge and skills required for disaster planning (Al Khalaileh et al., 2012).

A few studies done all over the world stated that, most of the nurses or healthcare workers are still insufficient in knowledge for disaster management. For example, studies conducted via a no-probability sampling method at selected tertiary hospitals in Lagos, Nigeria (Adenekan et al., 2016) and Nairobi, Kenya (Kiongo, 2015). Medical and non-medical experts in the hospitals were assessed and the overall knowledge level of the staff was 47.8% and 36% in Lagos and Nairobi, respectively. According in studies by Jennings-Sanders (2004) and Fung, et al. (2008), all nurses should increase their professional abilities to provide adequate pre-disaster and post-disaster health services by participating in prevention, reduction, preparation and rescue activities. The studies showed that almost all the nurses that involved were inadequately prepared (97%). Hospitals and healthcare facilities are required to conduct regular drill exercises to ensure that all healthcare workers, particularly in emergency departments, are able to effectively treat the different types of casualties resulting from various catastrophic events.

## Methodology

The researcher used a quasi-experimental design comprising of pretest and post-test intervention for the target group. A pretest and post-test design is used in this study to determine an intervention effect on a given sample. Quasi-experimental studies can include pre and post-intervention evaluations and no randomly selected control groups.

Populations and sampling the group of nurses that works in KPJ Puteri Specialist Hospital Johor Bahru with different years of working experiences. They are also inclusive of from different clinical area of working such as Surgical, Medical, Paediatric, Intensive Care Unit, and others. KPJ Puteri Specialist Hospital is served by total staff of 685 and total of 287 nurses. The research study involved 40 State Registered Nurse, pre-test and post-test given to the one control group to evaluate their knowledge and practice for pre and post-test regarding disaster drill in KPJ Puteri Specialist Hospital. The target of population will be from multiple wards in KPJ Puteri Specialist Hospital Johor Bahru. This study used stratified purposive sampling technique and all target populations as the sample size for this study. The research study was conducted at KPJ Puteri Specialist Hospital Johor Bahru, located in Johor Bahru town, which consists of 10 wards with various ages, gender, year of experience and different disciplines. The list of participants was obtained from the Registered Nurse working in KPJ Puteri Specialist Hospital and about 40 registered nurses out of 119 registered nurses participate during this study which about 33.6% of registered nurse.

### *Study Instruments*

The researcher gets permission to use these tools to collect data on nurses' knowledge and practices towards emergency and disaster preparedness in KPJ Hospital Specialist Hospital Johor Bahru. All questionnaires prepared in English. The Registered Nurses are able to communicate in English at the workplace in clinical context. The instrument consists of 3 parts of questionnaires' which related to Socio-demographic data sheet information, Knowledge Questionnaires on Disaster Preparedness and Questionnaires Practice of Participants related to Disaster Management. All questionnaires related to emergency disaster preparedness to identify nurses' knowledge and practice. Questionnaires distributed to 40 registered nurses who are participated in this study.

Section A of the data collection tool, consist of the following socio-demographic information the participant's gender, age, educational level, clinical position, working experience, experience attending disaster drill training and attended CPR or ACLS training. The Section B of questionnaires consists of item related nurses' knowledge on disaster management and emergency preparedness. They needed to tick a column of their preference among nominal scales which is '1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree'. The Section C id for practice on disaster drill training consist of 13 items and this categorize as Yes, No and Uncertain.

### **Data Collections Process**

This study involves interventions such as discussion-based exercise, mock drill disaster, group discussion and evaluation. Discussion-based exercises are done first to familiarize the nurses with theories, crisis plan, policies and emergency procedures. This also include sharing information, training groups to perform specific response activities, and building teams through discussion. The training methods involved are by Google Meet, WhatsApp group and



practical hands-on by mini mock drill that the respondents need to take part. Firstly, they participate in a disaster drill training lecture done virtually through Google Meet for duration of 2 hours. Questionnaires used during this study for pre and post intervention. Questionnaires was distributed to 40 registered nurse who are participate during the study. They need to complete the questionnaire in 7 days. The data collection process for pre intervention by Google Form respond began on Jun 01, 2021 till Jun 07, 2021.

Then, they are needed to participate in mini mock drill stimulation that was done at A&E Services KPJ Puteri Specialist Hospital. Each mini mock drill stimulation done for 1 hour for each group which consist of 4 participants in each group. The session was done for 8 days, roughly 2 groups per day. After these mock drill sessions finished, the Observers and Disaster Committee will give feedback regarding performance of each group. Generally, all groups were able to complete the drills in satisfactory. Mini mock drill done on October 21, 2021 till October 28, 2021. Post-test given after intervention to same participants, given 7 days to complete also, and collected on Dec 09, 2021 till December 15, 2021.

### **Data Analysis**

The researcher used a Statistical Package of Social Science (SPSS) latest IBM to verify data coding, entry, and analysis. As the first step in data collection, a check is performed for incorrect input and incomplete data. The Pearson correlation coefficient was used for the parametric evaluation, with the alpha degree set at 0.05 for all statistical tests. The raw demographic data of the participants are first interpreted and outlined in tables, numerical data, then introduced as descriptive demographic data, and finally, statistical analysis is performed.

### **Ethical Clearance**

Official permission will be obtained from Research Management Centre of KPJUC and from top management of KPJ Puteri Specialist Hospital before actual study. The confidentiality and anonymity were maintained to all participants who participate in this study. The study subjects were well assured and participants will be informed that there will be no force to participate and may decline to take part in the study.

### **Results**

This chapter mainly presented the result regarding the effect of nurse led disaster drill training on knowledge and practice of disaster management among nurses at KPJ Puteri Specialist Hospital. The respondents were asked about their gender, level, age and program in order to provide a good picture of the background of respondents.

Table 1

*Socio demographic pattern of the respondents (n=40)*

<i>Socio demographic</i>	<i>Frequency (f)</i>	<i>Percent (%)</i>	<i>Mean</i>	<i>Standard Deviation (S.D)</i>
<i>Age</i>				
<i>18 - 24 years old</i>	8	20.0		
<i>25 – 34 years old</i>	24	60.0	29.65	4.68
<i>35 – 44 years old</i>	8	20.0		
<i>Years of Services</i>				
<i>1 years to 2 years</i>	6	15.0		
<i>3 years to 5 years</i>	9	22.5		
<i>5 years to 9 years</i>	17	42.5	6.23	1.109
<i>More than 10 years</i>	8	20.0		
<i>Gender</i>				
<i>Male</i>	3	7.5		
<i>Female</i>	37	92.5		
<i>Clinical Area of Working</i>				
<i>- Surgical</i>	4	10.0		
<i>- Medical</i>	4	10.0		
<i>- Pediatrics</i>	5	12.5		
<i>- Orthopedic</i>	3	7.5		
<i>- Executive</i>	4	10.0		
<i>- Accident and Emergency</i>	3	7.5		
<i>- Hemodialysis</i>				
<i>- ICU/CCU</i>	3	7.5		
<i>- Operation Theatre</i>	3	7.5		
<i>- Special Care Nursery</i>	5	12.5		
	6	15.0		
<i>Current Position</i>				
<i>Specialist Nurse</i>	16	40.0		
<i>Staff Registered Nurse</i>	24	60.0		
<i>Attend BLS</i>				
<i>No</i>	9	22.5		
<i>Yes</i>	31	77.5		
<i>Pass BLS</i>				
<i>Passed</i>	31	100		
<i>Failed</i>	0	0.0		

From the total number of 40 respondents, 24 (60.0%) from them were 25 to 34 years old, followed by 35 to 44 years old, 8 respondents (20.0%) and 18 to 24 years old also 8 respondents (20.0%). There are 17 respondents (42.5%) from total out of 40 respondents. The

second higher were 3 to 5 years of services, 9 (22.5%) respondent and third were respondent with 10 years and above of services, 8 (20.0%) respondent. For the lowest, there are only 6 (15.0%) of respondent who are working for the first and second year. There are 37 (92.5%) respondents are female and 3 (7.5%) respondents are male. The highest number is respondent from Special Care Nursery which were 6 (15.0%) respondents. Then, follow by Operation Theatre were 5(12.5%) respondents and Pediatric also 5 (12.5%) respondents. The others were 4(10.0%) respondents from Surgical, 4 (10.0%) respondents from Medical, 4 (10.0%) respondents from Executive, 3 (7.5%) respondents from Orthopedic, 3 (7.5%) respondents from Accident and Emergency, 3 (7.5%) respondents from Hemodialysis unit and ICU/CCU also 3 (7.5%) respondents. There are only 31 respondents (77.5%) which are exposed with BLS training and about 9 respondents (22.5%) are not exposed to BLS.

Table 2

*The level of knowledge for pre-test and posttest of disaster drill training among nurses in KPJ Puteri Specialist Hospital Johor Bahru.(n=40)*

	<b>Low Knowledge (%)</b>	<b>Moderate knowledge (%)</b>	<b>High Knowledge (%)</b>
<b>Pre Test</b>	2 (5.0)	13 (32.5)	25 (62.5)
<b>Post-Test</b>	0 (0.0)	12 (30.0)	28 (70.0)

Table 2 shows that in pre-test, there are 25 (62.5%) of the nurses score as high knowledge, 13 (32.5%) as moderate knowledge and 2 (5.0%) of them scores as low knowledge. Meanwhile, in the post-test, it shows that there are 28 (70.0%) of the nurses score as high knowledge and 12 (30.0%) of them score as moderate knowledge, while none scores as low knowledge. These can be concluded that, there is increasing in the nurse who scores as high knowledge from 25 (62.5%) to 28 (70.0%) after the disaster drill training, while there is also decreasing in the nurses who are in low knowledge from 2 (5.0%) to 0 (0%) after the disaster drill training.

Table 3

*The level of practice for pre-test and posttest of disaster drill training among nurses in KPJ Puteri Specialist Hospital Johor Bahru (n=40)*

	<b>Low (%)</b>	<b>Moderate (%)</b>	<b>High (%)</b>
<b>Pretest</b>	3 (7.5)	12 (30.0)	25 (62.5)
<b>Post Test</b>	2(5.0)	5 (12.5)	33 (82.5)

Table 3 illustrates that in pre-test, there are 25 (62.5%) of the nurses score as high practice, 12 (30.0%) as moderate practice and 3 (7.5%) of them scores as low practice. However, in the post-test, it shows that there are 33 (82.5%) of the nurses score as high practice and 5 (12.5%) of them score as moderate practice, while 2 (5.0%) scores as low practice. Based on these result, it can be concluded that, there is increasing in the nurse who scores as high practice from 25 (62.5%) to 33 (82.5%) after the disaster drill training, while there is also decreasing in the nurses who are in low practice from 3 (7.5%) to 2 (5.0%) after the disaster drill training.



Table 4. The correlation relationship between knowledge and Practice on disaster drill training among nurses in KPJ Puteri Specialist Hospital Johor Bahru (n=40)

### Correlations

	N	Correlation	Sig.
Knowledge & Practice	40	.674	.000

\*\*Correlation is significant at the 0.01 level (2-tailed).

Table 5

The relationship between knowledge and Practice on disaster drill training among nurses in KPJ Puteri Specialist Hospital Johor Bahru (n=40)

### T Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Knowledge Practice	2.39	.453	.071	2.249	2.539	33.380	39	.000

\*\*Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4.12, the result for correlation for knowledge and practice was  $r = 0.674$ , which is large degree of correlation and p value is significant which is less than 0.05. The result for t-test was  $t(39) = 33.380$ ,  $p < 0.05$ . The result indicated that there is significant relationship between knowledge and practice on disaster drill training among RNs in KPJ Puteri Specialist Hospital Johor Bahru.

### Discussions

Good disaster management protects the lives of victims and rescuers. Nurses, with their advanced skills and knowledge of risk assessment and human physiological responses, as well as their understanding of cultural family structures and associated psycho social burdens, can play a key role in collaborating with health and social disciplines, government organizations and the private sector, and community groups during a disaster. Disasters are inevitable, and when they do occur, emergency medicine (EM) personnel must be able to respond quickly and accurately.

Knowing the proper triage algorithms is an important skill for all clinical first respondent and first respondent caring for these patients. Disaster medicine research suggests that while no training can possibly prepare EM doctors to perform triage for a truly large-scale incident, familiarity with the process helps the rescuer carry out triage tasks more efficiently and easily. This is important because well-performed triage is a determining factor in the survival of severely injured victims. Over the years, the WHO and other professional bodies have made efforts to promote hospital preparedness, for example the 2008-9 Global Disaster Response Campaign to "Protect Hospitals from Disasters" and most recently the 2010-11 'One Million Safe Schools and Hospitals' campaign (Arab et al., 2009)

The results of this study showed the positive effect of education on the knowledge and practice of nurses. Changes in levels of knowledge and attitudes lead to changes in performance. In this study shows that paired sample t-test is significant (mean: 2.375, S.D: 9.510,  $p < 0.05$ ) indicating that there is a significance in knowledge for pre-test and post-test. The effectiveness of conducting disaster drills or informational conferences in various fields has also been mentioned in other studies. A study showed that the implementation of educational programs reduced the mortality rate of those injured during a disaster. These programs improve staff awareness of existing plans for dealing with disasters, increase staff participation in planning, eliminate problems, and also improve staff skills in performing tasks (Gardner et al., 2016),

Other than that, paired sample t-test is significant also (mean: 1.375, S.D: 4.667,  $p < 0.05$ ) indicating that there is a significance in practice for pre-test and post-test of this study. The very low average pre-test score among all participants in the pre-intervention surveys confirms that existing training on disaster preparedness and, in particular, knowledge of the hospital emergency plan is insufficient and suggests the likely lack of interest and priority among health professionals and organizations. Researchers also recommended the need to include mass casualty care and disaster management training into undergraduate curricula. Most of the nurses only receive little disaster preparedness education/ training in their respective nursing school. As stated by World Confederation of Physical Therapy (2016), in a WHO survey assessing emergency preparedness in the health sector in Member States at regional and global levels, participants reported a lack of unit dedicated to emergency preparedness and response within the Ministry of Health.

Disaster preparedness training and education is considered the backbone. A study conducted to evaluate the effectiveness of an emergency preparedness training program for public health personnel in China found that emergency preparedness training improved knowledge level and increased attitude and behavior scores. behavioral intentions for emergency preparedness (Leiba et al., 2007). Nursing education institutions, which play an important role in disasters, should prepare students well for the mitigation, response, recovery and assessment phases of disasters.

In USA, The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has instructed every hospital to do their disaster plan twice a year (Bistaraki et al., 2011). All healthcare workers are involved to be knowledgeable regarding this disaster awareness, including nurses which usually works both under stable or emergencies situations in pre-hospital as well as hospital setting. Simulation exercises and disasters are tools for testing the capacity of a facility. They also help familiarize health care workers with how and what to do in real disaster situations. However, in this study area, a simulation exercise has only been conducted once in the hospital's history.

Other than knowledge and practice of nurses in disaster management, a few of emergency preparedness situations that reflected in critical situations included. Cases such as natural disasters, chemical, nuclear, man-provoked events, biological and explosive cases were presented in the study to see the level of the familiarity among the nurses. There are many KAP studies done in regards of nurse's disaster and emergency preparedness. In research done by nurses in Hong Kong, they established that nurses not adequately prepared for the disasters. However, they are aware in the need of the preparedness and the disaster training management should be included in their basic education. Disaster drills are an important practice for the healthcare workers to handle mass casualty incidents or public health crisis.

### *Implications*

*With the growing frequency of disaster events around the world, the need to prepare for education and training needs to be emphasized. Veenema (2018) stated that nursing is considered to be the biggest health profession. Nurses should be well and appropriately prepared with knowledge and skills for disaster management, starting early with their basic training and reinforcing in their on-the-job training. Nurses of all specialties should be equipped with all competencies for disaster prevention, preparedness, response and recovery phases. Disaster simulation need to be used as an educational strategy to prepare nursing students for disaster response and has been incorporated into the undergraduate nursing curriculum. Disaster preparedness education has been revised to include disaster nursing in nursing curricula (International Council of Nurses, 2009).*

The imitation was found to improve nursing students' understanding of disaster preparedness, their ability and confidence to deal with catastrophic situations, and to work in teams. Study emphasized that preparing nurses through various educational methods such as seminars, workshops, courses or conferences can improve their readiness and capability to deal with catastrophic situations (Kalanlar, 2018). Different study by Alim, et al (2015) showed that by exposing nurses to drills improved participants' knowledge and skills on disaster preparedness and also ensured that the drills generated the necessary understanding and capability to respond to disaster situations. All hospital staff should receive regular training through a range of educational programs and participation in simulation exercises (Corrigan & Samrasinghe, 2012). Additionally, conducting regular drills and training in healthcare facilities will provide caregivers with confidence that they have sufficient awareness of disaster management practices and procedures, leading to appropriate dominance in such occasions (Al Harthi, et al., 2020).

### *Limitations of The Study*

This study was done specifically in KPJ Puteri Specialist Johor Bahru, and only involves small group of respondents. To understand and to get more significant results on effectiveness of disaster drill training on knowledge and practice of disaster management among nurses, different approach can be done. One of it is by involving a bigger group of nurses and includes a few different nurses from other hospitals to join the research to provide more accurate results and data. The alternative methods such as interviews and observations can be considered to be used in the study to get more accurate and relevant data. Other than that, a more extensive study should be conducted with inclusion of sampling technique and collecting data from other KPJ Hospital.

### **Conclusion**

Based on the results gathered from the questionnaire, the findings show that majority of the respondents are female. The respondents are mostly age 25 to 34 years old. Other than that, most of the participant are from special care nursery, and more than half of the participant are staff registered nurse. Most of the respondents are exposed with BLS training and all of respondents who have BLS training are passed in BLS. Based on the finding, it could be concluded that there was a positive, large degree of correlation and significant relationship between overall knowledge and practice. For that reason, knowledge and practice was important in disaster management. The nurses were not well prepared for

disasters, but improved their knowledge and practices after attending disaster drills. Therefore, hospitals, government agencies, and leading healthcare organizations emphasize the need to be at the forefront of disaster preparedness for healthcare professionals.

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