Disaster Readiness among Nurses in Japan: Current Status Following the Great East Japan Earthquake

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Abstract

Objective: This study evaluates the self-perceived nursing readiness of Japanese nurses dispatched to disaster areas following the Great East Japan Earthquake. Identifying readiness deficits is the first step in providing targeted training and education to enhance disaster nursing readiness. **Methods:** This study employed a quantitative, non-experimental, descriptive research design. A purposive sample of participants (N = 427) was drawn from 171 of 609 randomly selected hospitals from all hospitals nationwide, including base disaster hospitals. Data were collected using the Readiness Estimate and Deploy ability Index Japanese Version (READI-J-V), which evaluates self-reported competencies in seven dimensions with 67 items measuring nursing readiness for disaster. These competencies are necessary for coping with unexpected disaster work environments. The data were analyzed using descriptive statistics and one-way analysis of variance (ANOVA). **Results:** Overall, the nurses reported moderate readiness levels; low levels were reported on several items. Nurses with previous dispatch experience, longer nursing experience, and a nursing specialty had higher total scores. The ANOVA also revealed significant differences in all seven dimensions of the READI-J-V. **Conclusion:** The findings support the need for a structured estimate tool that measures disaster nursing competencies and emphasizes training and education to ensure disaster nursing readiness

Keywords: disaster nursing, nursing readiness, competency, deploy ability index

1. Introduction

Japan has suffered a wide range of natural disasters, including two of enormous scope in the last 22 years. The Great Hanshin-Awaji earthquake - of magnitude 7.2 on the Richter scale - was the most devastating disaster in post war Japan, causing 5,488 deaths and more than 36,000 injuries, and leaving 320,000 people homeless. The earthquake revealed the wretched fragility of highly advanced urban infrastructure and the insufficiency of Japan's disaster response when faced with enormous calamities (Kunii, Akagi & Kita, 1995).

As a result of the 9.0-magnitude Great East Japan earthquake (the Big Quake), the northern parts of Iwate through to the southern parts of Ibaragi were affected by a tsunami. The areas destroyed extended some 500 km from the north to the south along the Pacific Ocean and 200 km from the east to the west toward the interior. Some 16,000 people were estimated to have died, with 4000 people still missing in August 2011 (Matanle, 2011), as reported by the National Research Institute for Earth Science and Disaster Prevention(Yamashita & Kudo, 2014).

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The tsunami engulfed coastal areas and obliterated whole towns. Moreover, the earthquake and tsunami combined to produce a third major facet of this disaster event, the meltdown at the Fukushima nuclear power plant, which forced thousands of families to evacuate (Dwyer, 2012).

Floods are another frequent type of naturally occurring disaster in Japan that causes loss of lives and untold destruction. In September 2000, for example, the Tokai flood overwhelmed Nagoya City, one of Japan's largest metropolises (Takao et al., 2011). In addition, Japan is also vulnerable to volcano eruptions (Cappello, Geshi, Neri, &Negro, 2015) and typhoons (Miyabuchi, 2015), some of which have caused large numbers of fatalities and extensive property damage.

This article aims to describe the degree of readiness of Japanese nurses dispatched to work in disaster areas and issues regarding the future preparedness of nurses to respond to disasters.

2. Background and Review of Literature

When a disaster strikes, nurses from across Japan are dispatched from private and government hospitals, clinics, and prefectural government health services to assist survivors. They serve often for prolonged periods of time in challenging environments (Chapman, 2008). Because of the enormity of the impact, many nurses who survive a major disaster in their home area then become active participants in disaster relief. For instance, after the Great Hanshin-Awaji Earthquake, 1,700 doctors and nurses were dispatched to the disaster area from hospitals and from the Kobe Prefectural Government's health services (Internal Report, Hyogo Prefecture, 1995). According to the Japanese Ministry of Health, Labor, and Welfare (MHLW), approximately 11,266 certified healthcare professionals and other disaster response personnel were dispatched to the disaster-stricken region after the Great East Japan Earthquake (Yokoyama et al., 2014). Chapman (2008) indicated that disaster events, both natural and man-made, have become of increasing concern internationally and that nurses are more likely to be confronted with the need to provide nursing care to victims affected by disasters.

With 33 years' experience as a director of nursing, the author of this study observed many nurses dispatched to the disaster area who were unsure of their role and who displayed symptoms of stress and anxiety during and after returning from their deployment. Mitani (2003) similarly reported that nurses sent to disaster areas often did not know what to do and felt that they needed to wait for direction from their supervisor or institution. This uncertainty in community disaster settings may be exacerbated by the fact that in most medical facilities, nursing personnel perform specialized, clearly defined clinical roles in a high-technology, highly automated environment (Zadinski, 2004). Nohara (2011) also concluded that challenges still exist concerning how to share information and coordinate overall activities among multiple public health response teams. Moreover, evidence-based disaster training is necessary to improve the knowledge and skills in disaster response for nurses; this was also agreed upon by other researches (Williams et al., 2008; Pesiridis et al, 2015).

Reineck(1996) observed that nurses must be trained so that they can practice their clinical nursing skills in austere environments. However, Oztekin (2015) found that nursing educators were underprepared to manage disaster situations. Nagasawa (2007) examined the subjects that were taught to students at nursing schools, finding a lack of instruction on disaster preparedness and management. She explained this situation by noting that disaster nursing is not a widely recognized specialization that few educators have extensive disaster nursing knowledge, and that curriculum restrictions limit the number of subjects that can be taught.

Nurses' lack of preparedness became a major issue in Japan following the 1995 Great Hanshin-Awaji Earthquake. In an attempt to address this problem, the MHLW was approached to incorporate disaster nursing into basic nursing education. As a result, a graduate technical school was established in 2005 to train nurses in delivering post-disaster assistance (Sasaki, 2014). By 2007, the MHLW had proposed setting up five graduate schools to educate nurses in disaster readiness and management. In 2014, a five-year government-funded graduate program for master's and doctoral-level nursing students began (Yamamoto, 2013).

In addition, the Ministry of Education, Culture, Sports, Science, and Technology established the "21st Century Center of Excellence(COE) program," the purpose of which was to determine the basic nursing capabilities required in disaster response and to train nurses in these capabilities.

This program conducted research on the core competencies involved in disaster nursing. Amidst this growing level of interest, Hayano (2009) developed a competency model to focus on nursing activities following a disaster and an educational program for training nurses to respond to such situations. Hata (2011) analyzed in narrative form the experience of nurses responding to a disaster to identify the knowledge, skills, and attitudes required to work effectively in this environment. Hata (2011) highlighted such factors as flexible thinking, creative problem-solving ability, and ethical commitment as well as attitude for and knowledge of disaster nursing. Yackel, Dargis, Horne, Tillman-Ortiz, and Scherr (2006) suggested that the focus should be on how nurses make decisions and prioritize activities during disaster situations when resources are typically scarce.

Despite the added interest and progress in teaching disaster subjects to nurses, the issue of how to select nurses to be dispatched to a disaster area has been largely ignored. Another remaining challenge is the gaps in individual hospitals' disaster readiness programming. Kunii (1995) reported that in Japan, the level and quality of disaster readiness differed between prefectures; 13 years later, Chapman (2008) reported similar findings. He found that education in disaster response, disaster planning, and surge capacity was generally not well implemented or standardized in the acute care setting and that gaps in disaster preparedness still existed.

At the global level, the International Council of Nurses (ICN) in cooperation with the World Health Organization developed the ICN Framework of Disaster Nursing Competencies in 2009. Earlier, Reineck(2001) described how the US military's creation of a nurse corps responsible for humanitarian relief and the training and education that it provided to those nurses resulted in improvement in their skills. However, little has been reported regarding the minimum conditions, information, and knowledge essential for the selecting and dispatching of civilian nurses in response to sudden-onset disaster events (Mitani, 2003).

3. Readiness Estimate and Deploy ability Index

Reineck (1996), pursuing her aforementioned concern that nurses needed additional skills specifically relevant to disaster intervention as opposed to those required in a hospital setting, developed an instrument to measure nurses' disaster preparedness, known as the Readiness Estimate and Deploy ability Index (READI). READI measures the ability of deployed US military nursing personnel. It is not yet appropriate for worldwide use because each country has different aspects of disaster preparedness and has different cultures. However, it can be used in the process of evaluating and training civilian as well as military nurses.

Among the various definitions of disaster readiness in the literature, Reineck (1996) defined it as a dynamic concept with individual, group, and system dimensions that combine to influence one's ability to accomplish the mission. Maeda (2014) defined nursing readiness as the preparedness capabilities necessary to provide adequate care in a disaster environment. Since the READI is designed to ensure an appropriate standard of preparedness to deliver nursing care and support in any type of disaster setting, we decided to adapt the READI for use with Japanese nurses.

In determining nurses' readiness for disaster response work, it is important to use appropriate, culturally sensitive measurement instruments. With this concern in mind, we adapted the READI to the Japanese context, following the procedure outlined by Hutchinson et al. (2006). The US version of the READI was translated into Japanese and then back-translated. The back translation was sent to Dr. Reineck (now Dr. Huebner) to ensure that the resulting questionnaire fit the original theoretical model. The face validity of the new READI J-V was then confirmed through administration of a pretest to a sample of nurses.

3.1. Characteristics of the US version of the READI

The READI is a survey questionnaire of self-reported competencies and behaviors based on six dimensions of readiness: clinical nursing competency, operational competency, survival skills, personal and psychological readiness, leadership and administrative support, and group integration and identification (Kovats Morris, Reineck, Finstuenk, 2001).

The READI comprises 87 items, all of which are measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The original READI had Cronbach's alpha ranging from 0.27 to 0.97; a US Air Force version had Cronbach's alpha of 0.80 to 0.96. Scores obtained on the READI indicate the respondent's level of disaster preparedness. Scores are divided into three categories: the green zone (4–5; ready), amber zone (2–4; moderately ready); and red zone (1–2; not ready).

3.2. Characteristics of the Japanese version of the READI

Following the guidelines for use of a translated scale, we confirmed that the READI-J-V had acceptable reliability and validity. In a confirmatory factor analysis, the READI-J-V extracted seven factors containing 67 items: clinical nursing competency, operational competency, and survival skills, stress coping, attitude of mind, leadership and administrative support, and group integration and identification.

In sum, since disasters occur frequently in Japan, evaluating nurses' readiness before they are sent into a disaster situation is important so that they will be able to fulfill their roles effectively when participating in disaster relief activities. This study aimed to determine the degree of readiness of nurses who may be dispatched to work in disaster areas using the Japanese READI-J-V.

4. Methods

4.1. Study design

A quantitative, non experimental, descriptive research design was selected for this study. The sampling plan was to recruit nurses who were dispatched or were prepared to be dispatched to assist survivors following the Great East Japan Earthquake. Nurses who participated in this study were selected on a voluntary basis from 171 hospitals that were randomly selected from a list of 2,283 hospitals across Japan.

4.2. Ethical considerations

The Ethics Committee of Kobe University approved this study. The collection of data was in accordance with the recommended ethical principles, and all individuals who agreed to participate in the study did so in an intentional, anonymous, voluntary, and informed manner.

4.3. Data collection

The MHLW provided contact information for 2,238 hospitals from across Japan. From this list of 2,238 hospitals, we randomly selected 171 hospitals. A letter describing the context and purpose of the study, along with a sample copy of the questionnaire and a postcard, was sent to the director of nursing at each hospital. The letter requested the director to inform the nursing staff about the study and request volunteers to participate in it. The desired number of nurse participants at each hospital was recorded on the postcards sent to the directors of nursing. The communication to each director of nursing also included a self-addressed envelope in which the completed questionnaires were to be returned.

4.4 Study participants

The purpose of the sampling was to recruit nurses who were dispatched to assist survivors following the Great East Japan Earthquake. As noted above, respondents were selected on a voluntary basis from 171 randomly selected Japanese hospitals. Questionnaires were the data source for this study. The demographic characteristics of participants were obtained from the questionnaires (Table 1).

There were 457 returned questionnaires, for an impressive response rate of 61.6%. Initial screening invalidated 30 of the questionnaires due to missing data, leaving 427 completed questionnaires (57.5% valid response rate).

5. Results

5.1. Demographic data

In terms of the respondents' nursing background, the top three categories were nursing management (21.8%), emergency care (14.3%), and surgical care (12.9%). The nurses had an average of 8.05 years of experience in their current specialty, with a standard deviation of 7.72 years. Forty-one nurses (9.6%) had been dispatched as mental healthcare team members. The average overall nursing experience of the participants was 20.02±8.46 years. Further socio demographic details of the sample are presented in Table 1.

Table1. SAMPLE DESCRIPTION(n=427)					
Variable	N	%	Variable	N	%
Age			Dispatching Facility and Organization [a]		
20-25	2	0.5	Hospital	153	35.8
26-30	26	6.1	Shelter	83	19.4
31-35	70	16.4	Municipality	23	5.4
36-40	82	19.2	Clinic	22	5.2
41-45	75	17.6	Others	21	4.9
46-50	70	16.4	First Aid Station	20	4.7
51-	102	23.9	DMAT	20	4.7
Total years of nursing experience			Health Center	14	3.3
1-4 Years	3	0.7	Mental Care Team Activities	5	1.2
5-9 Years	49	11.5	Affiliation [a]		
10-14 Years	82	19.2	Hospital	346	81.0
15 Years and Over	293	68.6	Others	60	14.1
Average	**20.02±8.46 Years**		Clinic	16	3.7
Nursing background			Establishment by [a]		
Nursing Administration	93	21.8	Public organization	236	55.3
Emergency Nursing	61	14.3	Others	94	22.0
Surgical Nursing	55	12.9	National	43	10.1
Internal Medicine	51	11.9	medical Corporation	33	7.7
Psychiatric	41	9.6	Social insurance organizations	4	0.9
Certified Nurse	33	7.7	Private Facility	2	0.5
Perioperative Nursing	25	5.9	Possibility of being dispatched		
Others	70	15.9	Yes	21	4.9
Current specialty			I will dispatch within 3months.	20	4.7
1-4Years	147	34.5	No	332	77.8
5-9Years	155	36.4	Others	51	11.9
10-14Years	68	15.5	The time of the Latest dister training		
15Years and Over	56	13.1	in 2013	119	27.9
Average	**8.05±7.72Years**		in 2012	130	30.4
When did you dispatch to the Tohoku district ?			in 2011	42	9.8
Within 24 hours	45	10.5	before in 2010	61	14.3
1day-3days	27	6.3	No experiences	28	6.6
4days-7days	23	5.4	Training period [a]		
8days-1month	191	44.7	Within 1 day	222	64.7
Within 2 months	88	20.6	2-3 days	92	26.8
2 months and Over	52	12.2	Over 4 days	29	8.5
Dispatch activity period [a]			**Average**	**1.63±2.28days**	
Within 3 days	137	32.1	Past disaster experience		
4-7days	247	57.8	Yes	71	16.6
8-14days	20	4.7	No	356	83.4
Over 15 days	13	3.0	Past disaster relief activities		
Average	**5.46±7.52days**		Yes	92	21.5
			No	335	78.5
			Past overseas dispatch activities experience		
			Yes	7	1.6
			No	420	98.4
a) Percentage of 427 people for the variable to have the missing values					

5.2. Disaster readiness assessments of Japanese nurses

The Japanese nurses' actual disaster readiness competency level was determined based on the results of the READI-J-V. Table 2 summarizes the mean values for the 427 respondents who participated in the East Japan Great Earthquake on subscale items related to self-reported preparation level and individual competencies.

Notably, the nurses' competence levels in caring for patients with Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) injuries was in the red zone, as was their self-assessed ability to provide ante partum and postpartum care as part of the clinical nursing competency.

In addition, the overall estimate of survival skills was at a low level; in particular, within this category, nurses had the lowest scores in navigation using a map and compass and in decontaminating themselves and patients using decontamination equipment. With regard to attitude of mind, having a current will was at a low level; on the other hand, the nurses had high ratings in the subcategory of leadership and administrative support.

On stress-related items, 64% of respondents indicated stresses in their current work, 34% said that they had family-related stress, and 31% were experiencing economic stress. The stress coping measures used by respondents included relaxation (34.9%), eating items that they enjoyed (30.5%), physical fitness (21.9%), smoking (10.3%), and religion (2.4%).

No	Item	mean	S.D.
Table 2. READI Individual Score			
Clinical Nursing Competency (37items)			
1	Familiar with the different types of shock	3.85	0.89
2	Competence in performing BLS algorithm	4.21	0.93
3	Competence in caring for hemorrhagic shock	3.41	1.20
4	Last time provided direct patient care	3.69	1.63
5	Triage education and training	4.19	1.20
6	Types of triage experience	2.18	1.38
7	Last time reconstituted, calculated, administered IV medication	3.97	1.60
8	Competence in code/emergency situation	3.78	0.96
9	Based on the patient's symptoms, competence in reporting to the doctor related to treatment	3.52	1.20
10	Competence in IV drip calculations	3.65	1.24
11	Competence in deciding which patient is seen first	3.31	1.21
12	ACLS protocol	3.22	1.31
13	Competence in caring for life threatening injuries	2.71	1.25
14	Understands body surface area burn patient	3.10	1.28
15	Calculates body surface area burn patient	2.49	1.40
16	Able to describe in detail the life-saving ABC principles	3.85	1.07
17	Competence in IV skills	4.42	0.89
18	Competence in assessing multiple trauma patient	3.07	1.29
19	Competence in caring for patient with CBRNE	1.61	0.86
20	Competence in recognition of tension pneumothorax	2.55	1.21
21	Competence in providing fluid resuscitation of burn patient	2.49	1.28
22	Competence in using universal blood donor protocol	4.17	0.93
23	Competence in field infection control	3.59	1.07
24	Competence in using a bag valve mask	4.29	0.90
25	Competence in airway management	4.10	0.98
26	Competence in assuming clinical team leadership	3.54	0.05
27	Competence in caring for survivor	3.16	1.09
28	Competence in providing antepartum and postpartum care	1.99	0.97
29	Competence in field infection control	2.50	1.20
30	Competence in orthopedic nursing	3.06	1.14
31	Competence in neurological nursing	3.03	1.19
32	Able to identify components of physical exam	2.96	1.00
33	Able to list five examination techniques to perform physical exam	3.06	0.98
34	Able to perform complete nursing assessment and interpret abnormal findings	3.12	0.95
35	Competence in deciding to control the pressure of tourniquet during bleeding	2.90	1.20
36	Competence in deciding to evacuate or follow-up during bleeding	3.24	1.14
37	Competence in deciding intravenous drip infusion during bleeding	3.08	1.16
Operational Competency (6 items)			
1	ST elevation	4.27	0.83
2	Competence in obtaining 12-lead EKG given scenario	4.56	0.78
3	Selecting appropriate airway apparatus	3.62	1.15
4	Safety suction	3.89	1.09
5	Competence in evacuation procedures	2.13	1.18
6	Competence in field sanitation and hygiene	2.30	1.18
Survival Skills (4 items)			
1	Competence in ability to perform duties in adverse conditions	2.06	1.21
2	Competence in ability to navigate using a map and compass	1.69	1.08
3	Competence in ability to decontaminate self and patient using decontamination equipment	1.71	0.99
4	Familiarity with standard Army communication equipment	2.31	1.40
Attitude of Mind(10 items)			
1	Have a current will	2.16	0.90
2	Rate ability to adjust to crowded coed sleeping quarters	4.13	0.97
3	Cope with different work circumstances like documentation, nursing skill, administration of medication and care for patients	3.62	0.72
4	Coping strategies for coping with stress	3.34	1.11
5	Rate preparedness for death, dying, carnage	3.56	0.98
6	Own possible death	2.72	1.20
7	Rate preparedness for weather extremes	3.52	1.04
8	Providing adequate nursing care under high risk situation	2.53	1.26
9	Rate preparedness for lack of privacy	3.39	1.03
10	Rate preparedness for long hours	3.74	1.02

Table 2. READI Individual Score(Cont.)			
No	Item	mean	S.D.
Stress Coping(4 items)			
1	Amount of current stress in finances	3.18	1.12
2	Amount of current stress in family	3.20	1.20
3	Amount of current stress at work	2.40	1.15
4	Have no legal matters pending	3.92	0.93
Leadership and Administrative Support (4 items)			
1	Rate deployment unit's leader's knowledge and concern for soldier's well being	4.26	0.88
2	Rate deployment unit's leader's ability to keep you informed	4.00	0.85
3	Feeling about disaster relief activities experiences	4.14	0.73
4	Rate deployment Unit's leaders's Consideration	3.85	0.86
Group Iintegration and Identification (2 items)			
1	Familiarity with deployment unit's mission, vision and values	4.04	0.80
2	Familiarity with your role/duty	4.17	0.76
	Total Score	217.3	36.88

5.3. Associations between the READI-J-V and background factors

The results of *t*-tests and a one-way analysis of variance (ANOVA) regarding the association between the total scores on the READI-J-V and disaster relief activities and experiences are presented in Tables 3 through 5. In addition, Tukey's multiple comparison was conducted in cases where a significant difference was observed in the one-way ANOVA. Several background factors were significantly correlated with total scores on the READI-J-V. As indicated in Table 3, nurses with 10 or more years of experience scored higher than the less experienced nurses. Dividing the nurses into four groups by background, those in critical, emergency, or preoperative care had the highest scores, whereas those in psychiatric care had the lowest. With regard to when they were dispatched after the earthquake, those sent within the first week scored higher than those dispatched later (Table 4). The nurses who were serving in the disaster area or believed that they might serve in that area during the next three months had higher scores than other respondents (Table 5), as did those who had received two or more days of training. Those who had actual disaster response or training activity experience scored significantly higher than those who did not. According to the open-ended comments related to preparedness for the next disaster, some psychiatric nurses expressed interest in receiving emergency response education about physical assessment and triage.

Table 3. Relation of the characteristics and total score (n=427)

Variable	n	%	mean	S.D	F Value [b]	Tukey
Age						
Twenties	28	6.6	208.79	32.44		
Thirties	152	35.6	218.86	34.79	1.76	
Forties	145	34.0	220.93	40.09		
Fifties	102	23.9	212.03	35.85		
Total years nursing experiences						
☐ Less than 10 years	52	12.2	203.85	34.45		
☐ Less than 15 from 10 years	82	19.2	221.63	35.93	4.23*	☐☐＞①
☐ 15 years over	293	68.6	218.43	37.15		
Nursing background [a]						
☐ Internal Medicine, Surgical, Pediatrics	114	26.6	211.39	33.43		
☐ Critical Care, Emergency, Perioperative	105	24.6	235.89	36.55	13.92**	☐＞④ ②＞①③④ ③＞④
☐ Nursing Management	91	21.3	213.85	31.32		
☐ Psychiatrics	41	9.6	192.56	34.12		

a) A percentage of 427 people since the variable has a missing value
b) ANOVA：Three or more values of comparison
*p＜0.05
**p＜0.01

Table 4. Relation of the activity background and total score in an East Japan Great Earthquake （n=427）

	Variable	n	%	mean	S.D	F Value [b]	Tukey
The time dispatched after the occurrence of an East Japan Great Earthquake [a]							
①	One day to One week	95	22.2	237.14	29.22	24.30**	①＞②③ ②＞③
②	Eight days to one month	191	44.7	216.62	36.86		
③	Over One month	141	33.0	204.77	36.02		
Disaster activities period [a]							
	From 4 days within 7 days	247	57.8	215.59	38.42	0.56	
	Within 3 days	137	32.1	219.29	35.47		
	From 8 days within 14 days	20	4.7	216.80	31.97		
	14 days over	23	5.3	223.91	33.74		
Facility of working in disaster [a]							
	Hospital	153	35.8	219.80	38.24	1.42	
	Shelter	83	19.4	220.28	37.60		
	Municipal Organization	23	5.4	209.00	36.18		
	Clinic	22	5.2	220.41	27.97		
	Aid Station	20	4.7	215.60	27.28		
	DMAT activities	20	4.7	230.35	35.66		
	Health Center	14	3.3	193.14	37.58		
	Mental Care Team	5	1.2	224.20	40.97		
	Others	21	4.9	222.71	33.84		
Affiliation at the time of dispatch [a]							
	Hospital	346	81.0	217.43	36.50	0.21	
	Clinic	16	3.7	211.44	35.29		
	Others	60	14.1	217.25	38.23		
Affiliation [a]							
	Public Medical Facilities	236	55.3	217.78	37.56	1.24	
	National Hospital	43	10.1	216.14	30.77		
	Medical Corporation Hospital	33	7.7	219.76	35.27		
	Social insurance organizations	4	0.9	192.25	45.86		
	Private Hospital	2	0.5	269.00	14.14		
	Others	94	22.0	215.77	37.31		

a) A percentage of 427 people since the variable has a missing value
b) ANOVA: Three or more values of comparison
*p＜0.05, **p＜0.01

Table 5: Relation of the activity background and total score in an East Japan Great Earthquake（n=427）

Variable	n	%	mean	S.D	F Value b)/t value	c) Tukey
Possibility of dispatch						
☐ Currently participating in disaster area	21	4.9	247.57	31.07		
☐ Possible within 3 months, but currently not participating in the disaster area	20	4.7	246.15	27.76	10.57**	①②>③
☐ Currently not possible to participate in disaster areas	332	77.8	211.79	36.37		④>③
☐ Others	51	11.9	228.22	32.20		
Latest disaster training a)						
☐ Within One year	130	30.4	217.98	39.02		
☐ Within Two years	119	27.9	231.08	32.70	10.63**	②>①③
☐ Within Three years	98	23.0	217.30	32.96		①②③>④
☐ No experience	33	7.7	193.85	27.81		
Training periods a)						
☐ One day	220	51.5	218.97	36.54		
☐ Two or more days	121	28.3	229.86	32.33	14.48**	②>①
☐ No experience	33	7.7	193.85	27.81		①②>③
Past disaster experiences						
Yes	71	16.6	231.82	35.09	3.69**	
No	356	83.4	214.37	36.59		
Past disaster activities experiences						
Yes	92	21.5	230.24	35.33	3.87**	
No	335	78.5	213.71	36.50		
Past overseas activities						
Yes	7	1.6	241.43	31.74	1.75	
No	420	98.4	216.87	36.86		

a)A percentage of 427 people since the variable has a missing value
b)student-t test : Comparison of two values
C)ANOVA : Three or more values of comparison
**p＜0.01

6. Discussion

The results of this study revealed that there were a number of gaps found in the competency of Japanese nurses' disaster nursing according to the dimensions of the READI. The actual state and issues of preparation for dispatching nurses who participated in the disaster relief activities during the Great East Japan Earthquake are discussed in this article. Differences in the characteristics of the sample (e.g., military vs. civilian nurses) make comparisons challenging between the present results and previous research. However, according to the surveys conducted by Rivers (2006) and Wilmoth (2007) in the United States ,US nurses had higher mean scores on Nuclear, Biological, and Chemical (NBC) injuries patient care than the subjects on Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) injuries patient care in this study, who had a very low mean score of 1.6 (Rivers, 2006, M=2.1, SD=0.97; Wilmoth, 2007, M=3.1, SD=1.0).

The NBC concept has been expanded to the newer CBRNE terminology, but the ideas are comparable in terms of understanding response to these types of injuries. This item had the lowest average rating on the READI in previous research(Rivers, 2006; Wilmoth, 2007).Furthermore, Obstetrics and Gynecology nursing competence in the previous research was higher (Rivers, 2006, M=3.2, SD=1.27; Wilmoth, 2007, M=3.1, SD=1.34) than in the present sample(M=2.0, SD=0.97), as were the scores on understanding the evacuation system(Rivers, 2006, M=2.6, SD=0.86 ;Wilmoth, 2007, M=3.4,SD=1.21; READI-J-V,M=2.1, SD=1.18)and on survival skills .It can be argued the difference in the scores are the result of American surveys being conducted for military nurses who received disaster preparedness training every year According to the open-ended comments related to preparedness for the next disaster, some participants would like to receive survival training.

The mean scores on all items related to leadership and administrative support were higher among Japanese respondents than that in the American survey. Furthermore, three items in the group integration and identification category were higher than the US scores as well. Notably, the average amount of nursing experience among our subjects was 20.2 years, which is at the expert level of Benner's stages of clinical competence (Benner, 2000). Furthermore, many of the respondents can build good human relationships within their organization due to their experience in nursing management. In addition, total scores on the READI-J-V were significantly correlated with various aspects of nursing experience and specialization.

Factors correlated with the total score on the READI-J-V included the time of dispatch after the earthquake, subsequent training experience, duration of disaster training, and designation as dispatch member. The earlier the time of their dispatch to earthquake and tsunami relief, the more likely respondents were to report having a high readiness level. Presumably, those who participated most intensely in the initial relief efforts gained the greatest knowledge from the experience; alternatively, they may have already been the best-trained responders or may have made more serious commitments to obtaining disaster training since March 2011. Those participants who had not attended disaster training for at least two years had lower READI-J-V scores than other nurses. This result suggests that annual disaster training is extremely important in preparing nurses for disaster response. This point is supported by Kunii (2012), who argued that the key point of disaster relief activities is the attitude to follow instructions under the leadership of the organization at the time of dispatch. For this to be achieved there must be ongoing preparedness training and education. This point was also commented on by Kunii (2012), who recommended that all disasters require personnel be prepared to cope with the needs of survivors. Williams et al. (2008) also emphasized that evidence-based disaster training is necessary to improve the quality of disaster nursing.

Preparedness training is crucial as all disasters have different characteristics that need to be addressed. There is no question that disasters, whether man-made or natural, have differing characteristics needing differing responses. This is the case for disasters during peace time or times of conflict. Having updated disaster training allows for greater knowledge and experience that can be applied when responding to a disaster; this will be beneficial to all survivors. Our results support the need for additional disaster preparedness training. We found that participants who had two or more days of disaster training were significantly more prepared than those with no experience or those with only one-day disaster training in a year. Results suggest that more than two days of disaster training in a year is most important. Tanno, Hirayama, Warabi, Hashimoto, and Kamada (2007) stated that training of two to three days was effective in training Japanese disaster medical assistance teams.

7. Study Limitations

This study was undertaken with nurses who were dispatched to the Great East Japan Earthquake. Given the first limitation in the sample, it is difficult to generalize the results of this study beyond the survey participants, who were assigned 171 selected Japanese general hospitals. In addition, the directors of nursing agreed to research cooperation. Moreover, the data was obtained using self-report methods; thus, bias may have occurred. Some respondents did not answer all question items; for statistical analysis, the assumption was made that an unfamiliarity question represented the topic. We acknowledge that it is necessary to improve the READI-J-V, for example, developing short-form version, increasing the number of participants for investigation, and clarifying the present status of a Japanese nurse's readiness level, regardless of the experience and inexperienced disaster relief activities.

8. Conclusion

This study aimed to identify the perceived readiness of Japanese nurses dispatched in response to the Great East Japan Earthquake regarding the competencies and activities required in post-disaster missions. The READI-J-V is a reliable tool for determining Japanese nurses' readiness in terms of their clinical and operational nursing skills as well as their survival skills. Based on the evidence provided by this study, the READI-J-V could be useful in disaster nursing education and disaster training by identifying those most suitable for disaster-related assignments and areas where they need further training.

We suggest that the READI-J-V could be deployed to assist in selecting personnel for disaster relief activities and that many nursing administrators could use it to provide nurses with appropriate information about their self-reported professional abilities. The READI-J-V effectively indicates one's preparedness to serve on the front lines during disaster response activities. Although this study demonstrates that Japanese nurses understand about their readiness to be dispatched to a disaster area, it also emphasizes the need to ensure that those who may be called on for disaster relief have the appropriate competencies. More Japanese nurses should be equipped with the requisite skills so that they can be deployed should a major disaster occur.

Acknowledgement

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About the Readiness Estimate & Deploy ability Index (READI) Copyright © 2010. The University of Texas Health Science Center at San Antonio from http://nursing.uthscsa.edu/onrs/resources/readi/, (http://nursing.uthscsa.edu/READI/Army.asp,http://nursing.uthscsa.edu/READI/AirForce.asp, http://nursing.uthscsa.edu/READI/Navy.asp, http://nursing.uthscsa.edu/READI/Civilian.asp) http://nursing.uthscsa.edu/onrs/resources/readi/READI-J-V(TAKAYO_MAEDA).pdf

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