Nurses’ Preparedness of Knowledge and Skills in Caring for Patients Attacked by Tsunami in Indonesia and Its Relating Factors

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Abstract

The tsunami disaster, which devastated Southeast Asia on December 26, 2004, had resulted to large number of deaths, caused injury to its thousand victims physically, emotionally and psychologically and has devastated irreparable damage to homes and infrastructure. This study aimed to describe the levels of nurses’ preparedness of knowledge and skills and to investigate the relationship between perceived severity and perceived risk, experience, training and education, and attending hospital disaster drill and nurse’ preparedness of knowledge and skills in caring for patients attacked by tsunami. Systematic random sampling was employed to recruit 97 staff nurses in a hospital in Banda Aceh, Indonesia. Data were obtained through self-reported questionnaires developed by researcher and her colleague which including five main parts: demographic data and work information, nurses’ clinical experience, nurses’ preparedness of knowledge, nurses’ preparedness of skill, and perceived severity and perceived risk. Pearson’ correlation was used to investigate the relationship between perceived severity and perceived risk, experience, training and education, and nurses’ preparedness of knowledge and skills and Chi-square was used to analyze attending hospital disaster drill. Perceived severity and perceived risk, experience, and training and education were statistically significant low positive correlation with nurses’ preparedness of knowledge (r = .35, p< .01), (r = .42, p<.01), (r = .32, p<.01) respectively, and with nurses’ preparedness of skills (r = .22, p<.05), (r= .28, p<.01), (r = .33, p<.01) respectively. Interestingly, attending hospital disaster drill was statistically had no correlation with either of nurse’ preparedness of knowledge ($\chi^2 = 1.8^b$, ρ> .05) or skill ($\chi^2 = 2.1^b$, ρ> .05). The findings provide evidence to be beneficial for establishment of nurses’ preparedness both in clinical setting and nursing curricula.

Keywords: Nurse, preparedness, knowledge and skill, patients attacked by tsunami.
Background and significance of the problem

On December 26, 2004, the largest recorded oceanic earthquake occurred which caused a gigantic tsunami. Indonesia received the highest damage caused by tsunami with 113,306 people died, 1,443 hospitalized, 10,078 missing, and 605,849 were reported as displaced by tsunami (World Health Organization, 2005). The most severely affected by tsunami was in Banda Aceh province, Indonesia which reported large numbers of death, injuries, and badly damage infrastructure including 5 hospitals and 77 health centres. Some of the hospitals were destroyed, hospital equipment were covered with mud, and file’s on patients’ information were destroyed (Garfield & Hamid, 2006). The aftermath of tsunami attacked victims faced problems such as injuries, fractures, near drowning, and most people were rendered homeless (Maegele, et al., 2005). Tsunami disaster also caused the psychological problems for the victims who underwent the horrible experiences resulting psychological trauma to develop stress such as acute stress disorder (ASD) and post traumatic stress disorder (PTSD) (Deeny & McFetridge, 2005; Mitchell, Sakraida, & Zalice, 2005). The PTSD of tsunami victims happened as the long term effects with the experienced the sense of loss such as loss the love ones, social network, business, and life of goal (Hatthakit & Thaniwathananon, 2007).

The nurses have played critical roles in treating many victims as possible in disaster situation (Rogers & Lawhorn, 2007). The participation of nurses in disaster is critical ensuring that nurses are aware and prepared to deal with casualties (Williams, Nocera, & Casteel, in press). Nurses who are prepared and trained for disasters can play an important role and cope better with good performance in disaster (Suserud & Haljamie, 1997). It is imperative that each nurse acquires a knowledge based and minimum set of skills to enable for responding in disaster situation in an appropriate manner (Chapman & Arbon, 2008). Determining the nurses preparedness for disaster particularly tsunami is important to achieve the better readiness in future.

Objectives

The objectives of this study were to determined: (a) the level of nurses’ preparedness of knowledge and skills in caring for patients attacked by tsunami in Indonesia, (b) the relationship between nurses’ preparedness of knowledge and skills and its relating factors in caring for patients attacked by tsunami in Indonesia.
Technical terms

The related factors to nurses’ preparedness of knowledge and skills referred to training and education, experience, perceived severity and perceived risk, and attending hospital disaster drill that influence the nurses’ preparedness of knowledge and skills. Training and education referred to the type and time of training related to disaster which was attended by the nurses. Experience referred to the nurse’s experience in caring for patients attacked by tsunami. Perceived severity and perceived risk referred to perception of nurses about the magnitude severity and the risk of next tsunami, and attending hospital disaster drill referred to the frequency of nurses to attend the hospital drill.

The nurses’ preparedness of knowledge referred to the perception of nurses regarding the extent to which they have been prepared to have some knowledge in caring for patients attacked by tsunami which consisted of tsunami impact and tsunami disaster management.

The nurses’ preparedness of skills referred to the nurses perception of nurses regarding the extent to which they have been prepared to have some skills in caring for patients attacked by tsunami which including triage, acute respiratory care, wound care, mental health care, psychosocial care, spiritual care, and patients referring.

Framework of the study

In this study, the concepts of related factors were developed based on training and education (Chapman & Arbon, 2008; Wetta-Hall, Fredrickson, Ablah, Cook, & Molgaard, 2006), experience (Suserud & Haljamie, 1997), perceived severity and perceived risk (O'Sullivan, et al., 2008; Rebmann, 2006), and attending hospital disaster drill (Kaji & Lewis, 2008).

The concepts of nurses’ preparedness of knowledge and skills were developed based on Unahlekhaka and Mehta (2006), Laurendeau, Labarre, and Senecal (2007), College of Registered Nurses of Nova Scotia [CRRNS] (2007), the International Nursing Coalition for Mass Casualty Education [INCMCE] (2003), and Maegele et al (2006) which also was generated as the concepts of nurses’ preparedness of skills in caring for patients attacked by tsunami (Figure 1).
Factors related to nurses’ preparedness of knowledge and skills in caring for patients attacked by tsunami:
1. Training and education
2. Experience
3. Perceived severity and perceived risk
4. Attending hospital disaster drill

Nurses’ preparedness of knowledge in caring for patients attacked by tsunami:
1. Impacts of tsunami
2. Tsunami disaster management

Nurses’ preparedness of skills in caring for patients attacked by tsunami:
1. Triage
2. Respiratory care
3. Wound Management
4. Mental health care
5. Psychosocial care
6. Spiritual care
7. Patient referring

Research methodology

Approximately 195 nurses from ED, ICU, OR, surgical, medical, and neurological ward that have responsibility in caring for disaster patients was served as the population in this study. Ninety seven samples were determined by power analysis ($\alpha = .05$, power $= .80$) (Polit & Hungler, 1999). The systematic random sampling technique was used to select the eligible subjects with the inclusion criteria were hospital government’s employee nurses or hospital contract’s nurses within at least 1 year had work experience.

In this study, five instruments were used: Demographic Data and Work Information Questionnaire (DDWIQ), Nurses’ Clinical Experience Questionnaire (NCEQ), Nurses’ Preparedness of Knowledge Questionnaire (NPKQ), Nurses’ Preparedness of Skills Questionnaire (NPSQ), and Perceived Severity and Perceived Risk Questionnaire (PSPQ). The DDWI questionnaire obtained demographic characteristics data, training and education, and attending hospital disaster drill. The instruments of NCEQ, NPKQ, and NPSQ were measured by using four point of Likert scales while the PSP questionnaire was measured by using three points of Likert scales. Both of NECQ and NPSQ instruments were developed by the researcher and her colleague for this study. The level of nurses’ preparedness of knowledge and skill was categorized into three levels: low 0-1.00, moderate 1.1-2.00, and high 2.01-3.00 which the higher score reflected higher perception of nurses ‘preparedness. Cronbach’s Alpha was used to test the reliability of instruments NCEQ (.96), NPKQ and NPSQ (.98), and PSPQ (.94) while Spearman
Rho and KR-20 were applied to test stability of training index ($\rho = .98$, $p<.01$), and attending drill ($\text{KR-20} = .96$).

This study was conducted after obtaining approval from the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University, Thailand, and Banda Aceh hospital permission. The questionnaires were distributed for participants through the head nurses of selected wards for confidentiality reasons and were returned back to the principal researcher through the head nurses within one week. The intention of protecting human rights was obtained during data collection from October 2009 until December 2009 with none of potential harm being developed. Pearson’s coefficient was used to investigate the relationship between perceived severity and perceived risk, experience, training and education, and nurses’ preparedness of knowledge and skills. Chi-square was used to investigate the correlation between attending hospital disaster drill and nurses’ preparedness of knowledge and skills. All the related factors and different types of nurses’ preparedness met the assumptions for the correlation test.

**Results**

The study findings showed that nearly half of the subjects were in the range of less than 30 years old (48.5%) with a mean age of 31 years old (SD = 5.9). The level of education was at diploma level for three-fourth of them (73.2%). Around one-third of the subjects (39.2%) were working from at least five to ten years as staff nurses. Most of the subjects (86.6%) had experience in caring tsunami patients with nearly half of them (48.5%) having a duration of involvement in caring around 3-6 months. The related factors of nurses’ preparedness of knowledge and skills revealed that perceived severity and perceived risk was 2.4 (SD = 0.6) and experience 2.0 (SD = 0.7). Moreover, training and education was measured by using an index calculated by the type of training multiplied by the times of training attendance with the score was 3.0 (SD = 0.7) and attending hospital disaster drill was measured by using dichotomous choice with the score was 0.6 (SD = 0.5).

The level of nurses’ preparedness of knowledge was at a moderate level with the highest mean score for knowledge disaster management of tsunami followed by knowledge impact of tsunami (Table 1).
Table 1
*Means, Standard Deviations, and the Levels of Knowledge Preparedness of the Subjects (N=97)*

<table>
<thead>
<tr>
<th>Nurses’ preparedness of Knowledge</th>
<th>M</th>
<th>SD</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge disaster management of tsunami</td>
<td>1.9</td>
<td>0.7</td>
<td>Moderate</td>
</tr>
<tr>
<td>2. Knowledge impact of tsunami</td>
<td>1.8</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total</td>
<td>1.9</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

The level of nurses’ preparedness of skills was at a moderate level. Three domains of nurses’ preparedness of skill were at a high level including wound care, acute respiratory care, and triage while the rest four domain including mental health care, psychosocial care, spiritual care, and patient referring were at a moderate level (Table 2).

Table 2
*Means, Standard Deviations, and the Levels of Skills Preparedness of the Subjects (N=97)*

<table>
<thead>
<tr>
<th>Nurses’ preparedness of skills</th>
<th>M</th>
<th>SD</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wound care</td>
<td>2.3</td>
<td>0.6</td>
<td>High</td>
</tr>
<tr>
<td>2. Acute respiratory care</td>
<td>2.1</td>
<td>0.6</td>
<td>High</td>
</tr>
<tr>
<td>3. Triage</td>
<td>2.1</td>
<td>0.6</td>
<td>High</td>
</tr>
<tr>
<td>4. Mental health care</td>
<td>2.0</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>5. Psychosocial care</td>
<td>2.0</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>6. Patients’ referring</td>
<td>2.0</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>7. Spiritual care</td>
<td>2.0</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total</td>
<td>2.0</td>
<td>0.6</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

The finding showed that there were a statistically significant low positive correlation between perceived severity and perceived risk, experience, training and education and both of nurses’ preparedness of knowledge and with nurses’ preparedness of skills (Table 3 & 4).
Table 3
Correlation coefficients between related factor and nurses’ preparedness of knowledge in caring for patients attacked by tsunami in Indonesia (N=97)

<table>
<thead>
<tr>
<th>Related Factor</th>
<th>Nurses’ Preparedness of Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Perceived severity and perceived risk</td>
<td>.33**</td>
</tr>
<tr>
<td>2. Experience</td>
<td>.48**</td>
</tr>
<tr>
<td>3. Training and education</td>
<td>.28*</td>
</tr>
<tr>
<td>4. Attending hospital disaster drill</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Note: *p<.05, **p<.01, 1= Disaster management of tsunami, 2= Impact of tsunami, a= Chi-square correlation (Fisher exact test)

Table 4
Correlation coefficients between related factor and nurses’ preparedness of skills in caring for patients attacked by tsunami in Indonesia (N=97)

<table>
<thead>
<tr>
<th>Related Factor</th>
<th>Nurses’ Preparedness of Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Perceived severity and perceived risk</td>
<td>.22*</td>
</tr>
<tr>
<td>2. Experience</td>
<td>.33**</td>
</tr>
<tr>
<td>3. Training and education</td>
<td>.28**</td>
</tr>
<tr>
<td>4. Attending hospital disaster drill</td>
<td>.80</td>
</tr>
</tbody>
</table>

Note: *p<.05, **p<.01, 1=Wound care, 2= Acute respiratory care, 3=Triage 4=Mental health care, 5= Psychosocial care, 6= Patients referring, 7= Spiritual care, a= Chi-square correlation (Fisher exact test)

Discussion
The level of nurse’s preparedness of knowledge was at moderate level as well as the nurse’ preparedness of skills means that the nurses still less prepare of their knowledge and skills in caring for patients attacked by tsunami. The educational background of the subjects might contribute to moderate level of preparedness. The findings showed that two-third (73.2%) of the subjects had educational background in diploma level and 26.8% had bachelor level. Diploma level of nurses had insufficient knowledge and skill with limitation ability to seek information regarding to improvement their competencies resulting to moderate level of knowledge and skill...
preparedness. Consistently, with (Carllisle, Luker, Davies, Stiwell, & Wilson, 1999) who mentioned that the diploma level of nursing is the lower form of education which limited competencies comparing other levels due to received basic level of nursing knowledge, have limitation in self development capabilities, difficulties to work as a team and limited ability to seek more information for the improvement of their knowledge and skill achievement. Moreover, currently in Indonesia, the content of disaster nursing is not integrated yet in nursing curricula either in diploma and bachelor (Muharso, 2006). This condition might influence nurses’ understanding about disaster preparedness and spending less effort on preparedness in caring disaster victims particularly tsunami.

Working experience as a nurses and experience in caring for tsunami patients might contribute to moderate level of preparedness. The findings showed that there were similar amount of percentage of nurses who have been working from five to ten years (39.2%) and have been working less than 5 years (24.7%). The majority of nurses had experience in caring tsunami patients (86.6%) with the duration of involvement around three to six month after struck categorized at late emergency response phase which can be stated that the nurses had insufficient experience in performing some skills in caring for tsunami patients. The nurses who had insufficient in working with limited direct experience in caring for tsunami patient might contribute to their ability to understand the important to prepare such knowledge and skill regarding disaster preparedness for future. This is in line with Suserud and Haljamie (1997) who pointed out that the experience will relate to readiness of actions. The readiness of nurses in preparing themselves commonly found with the nurses who have previous experience than limited experience.

Age difference of nurses might contribute to moderate level of nurses’ preparedness of knowledge and skill. Forty eight percent of nurses were in age less than 30 years old with the mean of age 23 (SD =5.9) categorized as young adult age. Young adult age nurses tend to be have limitation in cognitive function development resulting to insufficient to formulized critical thinking and problem solving ability which might influence their knowledge and skill’s preparedness. The study from Chan (2006) supported this idea which pointed out those nurses with older age (31-40 have) higher score of knowledge, attitude, and skill of clinical management system comparing with young age (< 30).
Moreover, attending training and education related to disaster might contribute to nurses’ knowledge and skill preparedness. Twenty three percent had training index score two compared to only 4.1% who had index score seven with several type of disaster preparedness training which offered by hospital with support from NGO after tsunami struck. The nurses were insufficient in taking continuous training lead the nurses have limitation in refreshment their knowledge and skill resulting to moderate level of preparedness. Wetta-Hall (2006) supported that the nurses as the first line in emergency response which required to posses the knowledge and skill by following training and education related to disaster as the ways to educated them about disaster preparedness.

Finally, attending hospital drill also might contribute to moderate level of knowledge and skill preparedness. The hospital drill is the way to train the hospital staff abilities in disaster response. The nurses who involved in the hospital drill have ability to recognize such knowledge and skill that needed in disaster response to be prepared. The hospital drill is important to allow familiarity about disaster response which has been used to train the employee capabilities within regularly applying at least once or twice a year to provide the realistic approach to disaster situation and the optimum way to test preparedness among hospital staff (French, Sole, & Byers, 2002; Kaji & Lewis, 2008).

According to the relationship, the findings showed that there were a statistically positive low correlation between perceived severity and perceived risk and nurses preparedness of knowledge (r = .35, p < .01) or with skill (r = .22, p < .05). Rebmann (2006) mentioned the perception of severity and risk of health care providers about disaster event may affect them to prepare. The nurses who accept risk perception and perceived severity about disaster will be engaged in activity of preparedness. Moreover, the risk perception covered the perception as the feeling and perception as process analysis with risk perception as process analysis influence the professional’s likelihood to seeking out relevant information regarding to preparedness activity (Barnett, et al., 2005).

The experience was statistically significant positive correlation with the nurses preparedness of knowledge (r = .42, p < .01) or with skill (r = .42, p < .01). Nasrabad, Naji, Mirzabeigi, and Dadbhaks (2007) mentioned that previous experience in critical situation requires nurses to maintain their preparedness of specific knowledge and skills in having work effectively in future. Nurses who adequately prepared for disaster will gain more confident,
while inexperienced nurses may contribute to stress and fear for disaster response (Chapman & Arbon, 2008).

Training and education was statistically significant positive correlation with nurses preparedness of knowledge \((r = .32, p<.01)\) or with skill \((r = .33, p<.01)\). Several kinds of training and education have been suggested for disaster preparedness which required the nurses to fully attend for having more understanding about their roles in such situation (Chapman & Arbon, 2008). Wetta-Hall et al (2006) pointed out that continuous education and training is the most likely preparedness effort route of nurses to knowledgeable and skillful as the first responder in disaster event. Previous study mentioned the important of continuing training. Tippet (2004) study support the attained of knowledge and skill between two period of training enhances knowledge and skill more effectively. The study from Scott et al (2006) figured out there was significantly increase mean score of skill between two different rotations of assessment of training either in team skill or individual skill. Hammond, Saba, Simes, and Cross study (2000) showed about retention of knowledge and skill after continuing the training. The performance of knowledge and skill will deteriorate since elapsed of time that the continuously training is significantly important to knowledge and skill.

Interestingly, this study figured out that there was no statistically significant correlation either with nurses’ preparedness of knowledge \((\chi^2 = 1.8^b, \rho>.05)\) or with skill \((\chi^2 = 2.1^b, \rho>.05)\). The hospital drill is important to allow familiarity about disaster response which has been used to train the employee capabilities within regularly applying at least once or twice a year to provide the realistic approach to disaster situation (French, et al., 2002; Kaji & Lewis, 2008). The hospital drill without enough preparation and might be stated as insufficient drill due to lack planning prior the drill resulting to untested nurses related to drill might contribute to nurses ability to preparing their competencies which need in disaster. This is relevance with Doung (2009) study that figured out nurses attended the drill exercise every 2 years or less with the form of drill such as desk top exercise or real time exercise for improving preparedness. Claudius et al (2008) study showed that the less standardized of drill might have limitation in improvement of the knowledge and skills of health providers in regard to preparedness.
**Conclusion and Recommendations**

The findings of the study concluded that both of the level of nurses’ preparedness of knowledge and nurses’ preparedness of skills were at moderate level. Related factors of perceived severity and perceived risk, experience, and training and education had positive correlation with the nurses’ preparedness of knowledge and skills except attending hospital disaster drill which was had no correlation with nurses’ preparedness of knowledge and skills in caring for patients attacked by tsunami in Indonesia. Providing regular intervention program on training and education for nurses is important for refreshing nurses’ knowledge and ensuring nurses’ skill for preparedness. It is crucial for the hospital to set up policy regarding disaster preparedness by establish administrative personnel, committee’ structure, and budgeting for planning the preparedness activity including the hospital disaster drill. The integrating disaster preparedness into nursing curricula is considered to improve the awareness of disaster preparedness, and further study including development practice guideline is needed in regard to improve disaster preparedness and to fulfill paucity information related to disaster nursing.
References


