

International journal of human & disaster

2018 3(1)

<Index>

1. Improvement Direction for the Operating System of CRISIS Management Manual in KOREA
/ **Ryu Sang-il**
2. Practice Levels of Hand Washing and Cough Etiquette for the Prevention of Infectious DISEASES
/ **Park Chung-mu**
3. Influenza VACCIINATION Status in KOREAN Adult
/ **Park Chung-mu, Yoon Hyun-seo**
4. The Relations of NURSING Student's Problem Solving Avility, Nurses' Image and Leadership for Patients Safety
/ **Lee Jin-hee**
5. The Development Guidelines for Anti-Earthquake DISASTER Training
/ **Park Ki-bum**

J-INSTITUTE

Publication state: Japan
ISSN: 2423-8260

Publisher: J-INSTITUTE
Website: <http://www.j-institute.jp>

Corresponding author
E-mail: 0174111012@daum.net

Peer reviewer
E-mail: editor@j-institute.jp

<http://dx.doi.org/10.22471/disaster.2018.3.1.01>

© 2018 J-INSTITUTE

Improvement Direction for the Operating System of CRISIS Management Manual in KOREA

Ryu Sang-il

Donggeui University, Busan, Republic of Korea

Abstract

Through analysis of operating system of crisis management manual in Korea, this study attempts to suggest the right direction for future improvement. First, it is necessary to simplify the preparation through accurate understanding of laws and regulations. In the meantime, given the Korean crisis management manual written too specifically, rather, there is too much in manual volume and there is not enough time to follow the manual sequentially in case of settlement disaster. At the time of the East Japan great earthquake disaster, they were accused of missing the Golden Time when they sequentially followed Japan's well-written manuals. Therefore, it is desirable to make it simple and easy to understand through an accurate understanding of relevant laws and regulations. Second, it is necessary to clearly distinguish roles between institutions through practical exchanges and cooperation networks. Under the current laws, this redundant design leads to an ironic situation in which when the actual disaster occurs, leaving responsibilities of an agency to another occurs between the agencies. Therefore, manual design to enable clear division of roles among institutions to some degree through practical exchanges and cooperation will enable quicker disaster response. Third, it is necessary to build a highly effective manual based on a scenario. Although the current crisis management manual is well written, but when applied to settlement actual disaster, it is difficult to apply due to the difference between reality and theory. Therefore, in order to be practical or to increase the possibility of reality, based on the scenarios, it will be easier to apply the reality by coping with the virtual scenarios by disaster type. Fourth, it is necessary to conduct situational judgment exercises through training. In the currently available crisis management manuals in Korea, all institutions are unified in identifying the level of crisis alarms such as concern, attention, warning, and seriousness, each level has different responses and its collaboration is different. However, in case of actual disaster, it is difficult to collaborate because it shows difference in crisis alarm level by each department or each institution. Therefore, it is necessary to conduct self-assessment exercises through scenario training. Fifth, there is an increasing need for preparing integrated manuals for complex disasters. Today, disasters do not simply end in one type of disaster, but multiply into multiple disasters. That is, when an earthquake occurs, the earthquake can lead to fire, collapse, environmental pollution, and even nuclear accident. As a result, the crisis management manual is a manual for one type of disaster, which makes it difficult to cope with a complex disaster. Therefore, the need for preparing integrated manuals considering complex disasters increases.

[Keywords] Korea, Disaster, Crisis Management Manual, Improvement Direction, Operating System

1. Introduction

Due to recent climate change such as global warming, etc., El Niño and La Niña phenomena have caused the summer typhoon to become even bigger, in winter, cold waves are getting

worse, and a large complex disaster continues to increase in our society.

It is the opinion of many experts that, in order to cope with these increasing disasters quickly and effectively, the crisis management manual

should be well prepared. On the other hand, the central government also has maintained to improve the problems exposed through various disaster response and training based on the manuals of each institution by constituting a 'Public-Private Joint Central Review Panel' every year, and in addition, they are intensively checking to make sure that the manual is up-to-date and that it is working in the field[1].

However, the crisis management manual has not been properly reflected in reality, suggesting that the effectiveness is questioned, the correct roles between institutions are difficult to distinguish, and, there are many problems such as lack of integrated manual to cope with recent complex disasters. Thus, through analysis of operating system of crisis management manual in Korea, this study attempts to suggest the right direction for future improvement.

2. Operating System of Crisis Management Manual and Legal Basis

The 'Crisis Management Manual' refers to a manual to prepare and operate according to disaster type in order for the disaster management institution's director to effectively operate and manage disasters according to Article 34-5 of the Framework Act on Disaster and Safety Management(Preparation and operation of disaster crisis management manual). There are three types including crisis management standard manual, crisis response operational manual, and on-site action manual[2].

First, the Crisis Management Standards Manual, as a document that defines the disaster management system and the roles and responsibilities of related organizations for the disasters requiring management at the national level is the basis for the preparation of the Crisis Response Practical Manual, and shall be completed by the head of the agency responsible for disaster management, that is, the head of the central administrative agency designated by the Presidential Decree. However, in case of a disaster involving a number of disaster management authorities, the Minister of Public Administration and Security may prepare a crisis management standard manual in consultation with the heads

of the agencies responsible for disaster management. Next, the crisis response practical manual, as a document stating the measures and procedures necessary for actual disaster response according to the functions and roles specified in the Crisis Management Standards Manual shall be prepared by the head of the disaster management organization and the heads of the related organizations. In this case, the chief of the agency responsible for disaster management can prepare the risk management response manual and the crisis management standard manual according to the first issue. Finally, the on-site action manual is a document detailing the actions taken by the agency that directly performs the task at the disaster site. This manual is prepared by the head of the agency designated by the head of the agency that prepared the crisis response operational manual. However, mayors, municipal governors, and district governors may prepare an integrated site action manual for each disaster type.

3. Operating System of Crisis Management Manual Focusing on On-Site Action Manual

In the case of the crisis management manual such as the on-site action manual in general, it directs the agency's direct mission and action measures at the disaster site such as the type of disaster in each type, crisis warning standard, emergency response system of central and local area, and collaboration function with related organizations are introduced in the disaster site[3].

First of all, as for the crisis types, in case of typhoon, there is a warning form and guideline of the Meteorological Agency. In accordance, local governments are to be aware of the types of crises in advance.

Next, in Korea, most of the crisis alarm levels are divided into concern, attention, warning, and seriousness. However, in case of radiation leakage, it is classified into white emergency, blue emergency and red emergency.

As a factor in determining crisis response, in the case of determining crisis response for a typhoon, for example, it is necessary to refer to the situation decision meeting and the level of

warning level considering the course, central pressure, size, intensity, accompanied wind speed, precipitation and direct/indirect influence zone.

In the case of central and local disaster response systems, the disaster and safety headquarters, the accident investigation headquarters, and the emergency rescue control unit are operated. However, there is a difference in the degree of operation depending on the size and extent of the disaster[4]. Lastly, the function of collaboration with related organizations is specified in the Crisis Management Manual.

4. Maintenance and Improvement Directions for Korea's Crisis Management Manual

First, it is necessary to simplify the preparation through accurate understanding of laws and regulations. In the meantime, given the Korean crisis management manual written too specifically, rather, there is too much in manual volume and there is not enough time to follow the manual sequentially in case of settlement disaster. At the time of the East Japan great earthquake disaster, they were accused of missing the Golden Time when they sequentially followed Japan's well-written manuals. Therefore, it is desirable to make it simple and easy to understand through an accurate understanding of relevant laws and regulations[5].

Second, it is necessary to clearly distinguish roles between institutions through practical exchanges and cooperation networks. Under the current laws, this redundant design leads to an ironic situation in which when the actual disaster occurs, leaving responsibilities of an agency to another occurs between the agencies. Therefore, manual design to enable clear division of roles among institutions to some degree through practical exchanges and cooperation will enable quicker disaster response[6].

Third, it is necessary to build a highly effective manual based on a scenario. Although the current crisis management manual is well written, but when applied to settlement actual disaster, it is difficult to apply due to the difference between reality and theory. Therefore, in order to

be practical or to increase the possibility of reality, based on the scenarios, it will be easier to apply the reality by coping with the virtual scenarios by disaster type[7].

Fourth, it is necessary to conduct situational judgment exercises through training. In the currently available crisis management manuals in Korea, all institutions are unified in identifying the level of crisis alarms such as concern, attention, warning, and seriousness, each level has different responses and its collaboration is different. However, in case of actual disaster, it is difficult to collaborate because it shows difference in crisis alarm level by each department or each institution. Therefore, it is necessary to conduct self-assessment exercises through scenario training[8].

Fifth, there is an increasing need for preparing integrated manuals for complex disasters. Today, disasters do not simply end in one type of disaster, but multiply into multiple disasters. That is, when an earthquake occurs, the earthquake can lead to fire, collapse, environmental pollution, and even nuclear accident. As a result, the crisis management manual is a manual for one type of disaster, which makes it difficult to cope with a complex disaster. Therefore, the need for preparing integrated manuals considering complex disasters increases[9][10].

On the other hand, even in the rescue of disaster in the article 6 of Jeong Yak-yong's Aeminyukjo, rescues of water disaster and fire should be carried out promptly in accordance with the national emergency relief regulations, and other matters unspecified in the manual are suggested by the county chief to be judged and processed. Also, in case of all disasters(fire and sinking), rescue activities should be performed as if they were one's own disaster, and it was suggested that anticipating and preventing disasters is much better than recovery assistance after a disaster. To see that the principle of disaster management, which was presented in the Joseon Dynasty is not behind that of today's, even from now on, problems should be diagnosed and improved.

5. Reference

5.1 Journal articles

- [5] Lee MJ & Cho HS & Rheem SK & Choi WJ. A Study on Simplification of Crisis Management Manual through Unit Job Analysis. *Journal of the Korean Society of Hazard Mitigation*, 17(3), 141-155 (2017).

5.2. Thesis degree

- [4] Kim JH. A Study on the Establishment of Korea National Crisis Management System in the Comprehensive Security Age. Kyonggi University, Doctoral Thesis (2011).

5.3. Additional references

- [1] <http://www.yonhapnews.co.kr/> (2017).
[2] Act on the Management of Disasters and Safety (2018).
[3] <http://www.mois.go.kr/> (2018).
[6] <http://www.edaily.co.kr/> (2018).
[7] <http://www.ggilbo.com/> (2018).
[8] <http://www.newsis.com/> (2018).
[9] <http://www.asiae.co.kr/> (2018).
[10] <http://m.asiailbo.co.kr/> (2018).

Author

Ryu sang-il / Dongeui University Professor
B.A. Cheongju University
M.A. Chungbuk National University
Ph.D. Chungbuk National University

Research field

- The Relationship between Organizational Culture and Organizational Competency of Fire Fighting Organizations, *Crisisonomy*, 12(2) (2016).
- A Review of Response Systems to Food Terrorism in the US: Implications for South Korea, *Crisisonomy*, 12(2) (2016).

Major career

- 2016~Present. The Korean Association for Crisis and Emergency Management, Vice-President

Publication state: Japan
ISSN: 2423-8260

Publisher: J-INSTITUTE
Website: <http://www.j-institute.jp>

Corresponding author
E-mail: cmpark@deu.ac.kr

Peer reviewer
E-mail: editor@j-institute.jp

<http://dx.doi.org/10.22471/disaster.2018.3.1.05>

© 2018 J-INSTITUTE

Practice Levels of Hand Washing and Cough Etiquette for the Prevention of Infectious DISEASES

Park Chung-mu

Donggeui University, Busan, Republic of Korea

Abstract

The 2017 community health survey data were analyzed to investigate the practice levels of hand washing and cough etiquette that are of use for infectious diseases. The findings of the study were as follows: As for awareness of the prevention of infectious diseases by hand washing, the awareness levels of the urban residents were higher, and the practice levels of hand washing before meals over the past week were higher among the county residents. The practice levels of hand washing after the use of the restroom over the past week were higher in the urban residents, and the frequency of using soap or hand cleaners was higher in the urban residents as well. Concerning experience of hand-washing education and publicity, the urban residents had more experience. The younger respondents had more experience of receiving hand washing education, and the respondents whose income levels were higher had more hand-washing education experience. As to the practice levels of cough etiquette, the practice levels were higher when the income levels were higher. Therefore in order to raise the practice levels of hand washing and cough etiquette, sustained education should be provided in various manners, and the development of educational programs tailored to older people seems to be necessary.

[Keywords] Cough, Handwashing, Handwashing Education, Infections Disease, Prevention

1. Introduction

According to the data released by the WHO in 2016, approximately 11,000 people died of ebola that occurred in 2014 in West Africa[1]. In our country, as many as 36 people died of Middle East respiratory syndrome according to an announcement by Korea Centers for Disease Control and Prevention[2]. And infectious diseases that aren't well known or lately have occurred are found regardless of region or natural circumstances.

As a means of preventing these infectious diseases, the practice of hand washing is recommended. Curtis & Caimcross's study[3] that investigated local residents in 2003 found that hand washing with soap was effective at lowering the rate of diarrhea patients by 47 percent.

Specifically, the importance of cough etiquette continues to be stressed to prevent respiratory infectious diseases and droplet infection. According to the 2014 survey of Korea Centers for Disease Control and Prevention, only 37.6 percent of the adults put it in practice. The respondents who covered their mouths and noses with tissue accounted for 67.1 percent only, and the respondents who used their sleeves when they coughed just represented 41.6 percent[4]. They were aware of cough etiquette, but their rate of practicing it was lower than that of the students. When their communal living in the workplace, etc., is taken into account, it might lead to a huge problem if they are exposed to diseases such as influenza.

There is a lot of improvement in hand washing as a way to prevent influenza or respiratory infectious diseases like MERS, but few studies

have ever investigated even awareness of hand washing[5]. Given this fact, it will be required to examine awareness levels and educational experience on not only hand washing but cough etiquette to obtain some data on how to develop educational materials.

The purpose of this study was to examine the hand-washing education experience of local residents and their practice levels of it in an effort to offer some information on how to raise the practice levels of hand washing and cough etiquette.

2. Method

2.1. The subjects & method

The data used in this study were the data of the 2017 community health survey that was conducted on adults who were at the western ages of 19 and up. As to items, there were six items on general characteristics(gender, age, academic credential, marital status, income level and whether to engage in economic activity or not), the implementation or non-implementation of influenza vaccination by five items on general characteristics(region, gender, age, income level and whether to engage in economic activity or not). Concerning the practice of hand washing(before meals, after the use of the restroom and after going out), 1 point was given to the answer choice "always": 2, to "often": three, to "from time to time": four, to "rarely." Concerning awareness of the prevention of infectious diseases by hand washing, 1 point was given to the answer choice "very helpful": 2, to "helpful"; three, to "not helpful"; four, to "never helpful." A lower score was regarded as indicating a better practice. One item was about hand-washing experience, and the practice levels of cough etiquette were rated on a five-point scale. A lower score indicated a higher practice level.

2.2. Data analysis

IBM SPSS Statistics Ver. 23.0 was employed. To find out the characteristics of hand washing by region, t-test was conducted, and x2(chi-square) test was used to analyze their educational experience on hand washing by the general characteristics. To determine the practice

levels of cough etiquette by the general characteristics, t-test and ANOVA were carried out. The level of statistical significance was set at 0.05.

3. Results

3.1. The awareness and practice levels of hand washing by region

The awareness and practice levels of hand washing by region are shown in <Table 1>. "The awareness of the prevention of infectious diseases by hand washing" was better in the urban residents($p < 0.001$), and "the practice levels of hand washing before meals over the past week" were higher among the county residents($p < 0.001$).

"The practice levels of hand washing after the use of the restroom over the past week" were higher among the urban residents($p < 0.001$), and "the frequency of using soap or hand cleaners" was higher in the urban residents as well($p < 0.001$).

Table 1. The awareness and practice levels of hand washing by region.

Characteristic	City	Country	t	p
Hand washing prevention of infection	1.38 ±0.51	1.44 ±0.52	-8.042	0.000
Wash hands before meal in the recent week	1.65 ±0.76	1.57 ±0.75	-6.632	0.000
Washing hands after using toilet in recent week	1.53 ±0.74	1.53 ±0.73	-0.121	0.903
Wash hands after going out for the recent week	2.05 ±0.99	2.10 ±1.00	-3.807	0.000
Frequency of use of soap or detergent	2.00 ±0.96	2.16 ±1.01	-10.597	0.000

3.2. The experience of hand-washing education and publicity by the general characteristics

The experience of hand-washing education and publicity by general characteristics is shown in <Table 2>. By region, the urban residents(71.5%) had more experience than the county dwellers (64.8%)($p < 0.001$). By age group,

the younger respondents had more hand-washing education experience($p<0.001$).

By income level, the respondents whose income levels were higher had more hand-washing education experience($p<0.001$).

By gender, the men had more experience, and the respondents who didn't engage in economic activity had more experience, but the differences were not statistically significant.

Table 2. The experience of hand-washing education and publicity by the general characteristics.

Characteristic	Division	Handwashing education experience		x ²	p
		Yes	No		
Region	City	6426(71.5)	2565(28.5)	87.462	0.000
	Country	5369(64.8)	2911(35.2)		
Sex	Man	5364(68.5)	2366(31.5)	0.298	0.588
	Woman	6431(68.1)	3010(31.9)		
Age group	20	1069(72.5)	405(27.5)	24.341	0.000
	30	1383(70.5)	578(29.5)		
	40	1975(68.2)	921(31.8)		
	50	2481(68.2)	1157(31.8)		
	60	2301(67.6)	1103(32.4)		
	70<	2586(66.3)	1312(33.7)		
House incom	>100	2749(64.8)	1495(35.2)	52.893	0.000
	100-199	2074(68.6)	948(31.4)		
	200-299	1939(67.6)	928(32.4)		
	300-399	1805(68.1)	847(31.9)		
	400-499	1358(72.0)	529(28.0)		
	500<	1870(72.0)	729(28.0)		
	Economic activity	Yes	7640(68.3)		
No	4155(68.4)	1923(31.6)			

3.3. The practice levels of cough etiquette by the general characteristics

The practice levels of cough etiquette by the general characteristics are shown in <Table 3>. By region, the urban dwellers got 2.58, and the county residents got 2.83. The practice levels of the urban dwellers were higher($p<0.001$). By age group, the younger respondents put it in practice better($p=0.001$).

By income level, higher income levels led to the higher practice levels of cough etiquette($p<0.001$).

By gender, there were no differences between the men and the women, and the respondents who engaged in economic activity put it in practice better, but the difference was not statistically significant.

Table 3. The practice levels of cough etiquette by the general characteristics.

Characteristic	Division	Coughing etiquette Practice	t/F	p
Region	City	2.58±1.04	-15.844	0.000
	Country	2.83±1.04		
Sex	Man	2.70±1.05	-0.386	0.700
	Woman	2.70±1.05		
Age group	20	2.65±1.05a	21.869	0.001
	30	2.67±1.05a		
	40	2.68±1.05a		
	50	2.70±1.05a		
	60	2.69±1.05a		
	70<	2.76±1.05b		
House incom	>100	2.78±1.04d	63.478	0.000
	100-199	2.73±1.05cd		
	200-299	2.71±1.04bc		
	300-399	2.62±1.06a		
	400-499	2.62±1.06a		
	500<	2.67±1.05ab		
Economic activity	Yes	2.70±1.05	0.679	0.497
	No	2.69±1.05		

4. Discussion

Hand washing, which is the first step to prevent infectious diseases, is of greater importance than anything else, but that is often regarded just as a personal matter of hygiene management. But that is no longer a personal matter. Instead, that is found to have closely been linked to the health of local residents because it has a great ripple effect on local community. Therefore this study attempted to investigate the awareness, practice and educational experience

of hand washing and the practice of cough etiquette to devise how to raise the awareness and practice levels of hand washing and cough etiquette.

There was a better awareness on the prevention of infectious diseases by hand washing in the urban residents. Yoo & Jeong's study[6] found that being more exposed to mass media led to higher awareness and better ability to cope with infectious diseases. When that is taken into consideration, various media should be utilized to raise awareness of infectious diseases and inform about how to wash one's hands.

The frequency of hand washing and that of using soap or hand cleaners after the use of the restroom over the past week were higher among the urban dwellers. Lee, et. al.'s study[7] found that the rate of practicing hand washing with soap just stood at 16 percent. Given this finding, it's feared that an infectious disease might be pandemic. To remedy the situation, washing one's hands properly is more important than just washing itself in hand-washing education, and the proper use of hand cleaners is of importance as well. So all these things should be included in hand-washing education.

In general, hand-washing awareness and practice levels were higher in the urban residents, but there were no differences between the county and urban dwellers in practice levels after the use of the restroom. This runs counter to the finding of Lee, et. al.'s study[7] that the levels were higher in the county areas. The reason seemed that the county dwellers were more concerned about hand washing because they considered their environments worse, and prolonged monitoring seems necessary.

In terms of the experience of hand-washing education and publicity, the urban respondents had more experience. The younger ones had more hand-washing education experience, and the respondents whose income levels were higher had more hand-washing education experience. The rate of being exposed to ads related to hand washing in 2006 just stood at 17.4 percent[8], but it rose in 2011 to as much as 57.2 percent[9]. In addition, the rates were higher in the women, the younger people and those

whose income levels were higher, which coincides with the findings of this study[10]. Accordingly, a survey should be implemented to prepare ads and education tailored to people who earn a smaller income or who are less educated.

In 2013, Korea Centers for Disease Control and Prevention[11] tried to produce educational media and ads that targeted children. But when the finding that the older respondents had less educational experience is taken into consideration, education should be provided for the elderly as well as children in various ways.

The practice levels of cough etiquette were higher in the urban respondents, in the younger ones and in the respondents whose income levels were higher.

In particular, elderly people who received education on cough etiquette just accounted for 5.7 percent in 2015, but Song & Yang's study[12] in 2017 found that the rate rose to 35 percent. Nonetheless, the rate of the educational experience was still low. Given the fact that education is useful for the improvement of awareness, regular education is necessary to raise the awareness and have the right understanding of cough etiquette. Specifically, that is more important than anything else for senior citizens whose immunity is poor, and there should be a place where they can properly be educated about hand washing and cough etiquette.

To improve the awareness and practice levels of hand washing and cough etiquette, educational programs by life cycles should be developed, and education should be offered on a permanent basis. Besides, educational programs tailored to different people should be provided to raise the practice levels to prevent infectious diseases.

5. Reference

5.1. Journal articles

- [3] Curtis V & Caimcross S. Effect of Washing Hands with Soap on Diarrhoe a Risk in the Community: A Systematic Review. *The Lancet Infectious Diseases*, 3(5), 275-281 (2003).
- [5] Jeong JS & Choi JK & Jeong IS & Paek KR & In HK & Park KD. A Nationwide Survey on the

- Hand Washing Behavior and Awareness. *Journal of Preventive Medicine and Public Health*, 40(3), 197-204 (2007).
- [6] Yoo WH & Chung YK. The Roles of Interpersonal Communication between Exposure to Mass Media and MERS-preventive Behavioral Intentions: The Moderating and Mediating Effects of Face to Face and Online Communication. *Korean Journal of Broadcasting and Telecommunication Studies*, 30(4), 121-151 (2016).
- [7] Lee YH & Lee MS & Hong SJ & Yang NY & Hwang HJ & Kim BH & Kim HS & Kim EY & Park YJ & Lim GU & Kim YT. Related Factors to Handwashing with Soap in Korean Adults. *The Journal of Korean Society for School & Community Health Education*, 17(1), 89-99 (2016).
- [10] Kim HS & Lee MS & Kim BH & Yang NY & Hwang HY & Hong JY & Hong SJ & Kim EY & Kim YT & Park YJ & Lim GU. The Effects and Related Factors of Public Service Announcement on Hand washing. *Korean Journal of Health Education and Promotion*, 32(2), 1-13 (2015).
- [12] Song MS & Yang NY. Knowledge and Compliance with Cough Etiquette among Elderly in the Community. *The Journal of Korean Academic Society of Home Care Nursing*, 24(1), 52-60 (2017).

5.2. Additional references

- [1] <http://apps.who.int/> (2016).
- [2] <http://www.cdc.go.kr/> (2015).
- [4] <http://www.cdc.go.kr/> (2014)
- [8] Korea Center for Disease Control and Prevention (2006).
- [9] Korea Centers for Disease Control and Prevention (2011).
- [11] Korea Centers for Disease Control and Prevention (2013).

Author

Park Chung-mu / Dongeui University Professor
 B.A. Inje University
 M.A. Inje University
 Ph.D. Inje University

Research field

- Luteolin and Luteolin-7-O-glucoside Strengthen Antioxidative Potential through the Modulation of Nrf2/MAPK Mediated HO-1 Signaling Cascade in RAW 264.7 Cells, *Food Chemistry and Toxicology*, 65 (2014).
- TOP 1 and 2, Polysaccharides from Taraxacum Officinale Inhibit NFκB-mediated Inflammation and Accelerate Nrf2-induced Antioxidative Potential through the Modulation of PI3K-Akt Signaling Pathway in RAW 264.7 Cells, *Food Chemistry and Toxicology*, 66 (2014).

Major career

- 2011~2013. Inje University College of Medicine, Research Professor
- 2013~present. Dongeui University, Assistant Professor

Publication state: Japan
ISSN: 2423-8260

Publisher: J-INSTITUTE
Website: <http://www.j-institute.jp>

Corresponding author
E-mail: yoohs@deu.ac.kr

Peer reviewer
E-mail: editor@j-institute.jp

<http://dx.doi.org/10.22471/disaster.2018.3.1.10>

© 2018 J-INSTITUTE

Influenza VACCIINATION Status in KOREAN Adult

Park Chung-mu¹

Donggeui University, Busan, Republic of Korea

Yoon Hyun-seo^{2*}

Donggeui University, Busan, Republic of Korea

Abstract

The purpose of this study was to examine influenza vaccination based on the 2014-2017 local community health survey data for a region in an effort to seek ways of increasing influenza vaccination rates. The flu vaccination rates were higher among the people who were women, who were in their 70s and up, who were less educated, who were married(had no spouses), whose income levels were lower and who didn't engage in economic activity. Therefore in order to raise influenza vaccination rates, it seems necessary to make vaccination recommendations to more people to increase the rates of the younger generation and of the economically active population.

[Keywords] *Influenza, Flu Vaccination, Subjective Health Status, Community, Vaccination Rates*

1. Introduction

All around the world, influenza viruses go around in fall and winter, and the flu season is gradually getting longer. So influenza has been designated as one of legal communicable diseases[1]. According to the 2018 press release of the Korea Centers for Disease Control and Prevention, the number of hospitalized pneumonia patients was twice as large as that of hospitalized flu patients as of 2015, and treatment for the former cost four times that for the latter[2]. It's reported that flu vaccination has approximately 70% effects on healthy people, though the effects vary with the virus and the epidemic strain[3]. At present, flu vaccination is provided mainly for children and senior citizens aged 65 and over, and the vaccination rates are found to have been lower in those who are in their 20s to 50s and actually engage in economic activity. That takes a toll on individuals and society and detracts from job efficiency[4]. According to the 2015 data of the Korea Centers for Disease Control and Prevention, the vaccination rate of elderly people aged 65 and up stood at 80 percent

or more, but that of adults just stood at 33 percent, over which there are a lot of concerns[5].

Influenza is classified into flu A(H1N1, H3N2) and flu B(victoria, yamagata) according to the viruses. In 2017, the World Health Organization predicted a trivalent vaccine would work, but people in our country were mostly infected with the flu B yamagata. Thus, it's not easy to make the right prediction, and many people who were vaccinated against flu were actually infected with it[6]. As people who have died from the flu each year are on the rise, it can be said that flu vaccination is a matter that is quite crucial both on personal and national levels.

In our country, however, it's recommended that only little children aged between six and 59 months, senior citizens aged 65 and up, patients with chronic diseases and medical personnel should be vaccinated against the flu, and that is not recommended to company employees whose flu incidence rate is higher and to students who are in adolescence[7].

The purpose of this study was, therefore, to examine the changes of the vaccination rates over the four years, the implementation or non-implementation of vaccination according to general characteristics and the relationship between the vaccination and self-rated health in an attempt to offer some information on how to raise the vaccination rate.

2. Method

2.1. The subjects & method

As for the materials of the study, the data of the local community surveys of Changwon city that were conducted on adults at the western ages of 19 and up from 2014 to 2017 were utilized. Concerning the items, there were one item on whether to be vaccinated or not, six on general characteristics (gender, age, academic credential, marital status, income level and whether to engage in economic activity or not), and one on self-rated health level. A five-point scale was used, and one point was given to the answer choice "very good"; two, to "good": three, to "so-so": four, to "bad": five, to "very bad". A lower score indicates finding oneself to be in better health.

2.2. Data analysis

IBM SPSS Statistic Ver. 23.0 was employed. To analyze the implementation or non-implementation of vaccination according to the general characteristics, χ^2 (chi-square) test was carried out, and t-test was conducted to find out their self-rated health awareness according to the implementation or non-implementation of vaccination. The levels of statistical significance were set at 0.05.

3. Results

3.1. Flu vaccination by the general characteristics

The flu vaccination rates by the general characteristics are shown in <Table 1>. By gender, the vaccinated men accounted for 33.9 percent, and the vaccinated women accounted for 37.2 percent. The women outnumbered the

men ($p=0.041$). By age group, the vaccinated respondents who were in their 70s and over represented 85.8 percent, which was the highest rate, followed by those in their 60s with 57.2% and those in their 30s with 34.6% ($p<0.001$). By educational level, the vaccination rate was higher among the less-educated respondents ($p<0.001$). By marital status, the vaccinated respondents who were married (had no spouses) accounted for 49.4 percent, which was the highest rate. The rate was higher among the respondents whose income levels were lower, and the rate of the respondents who didn't engage in economic activity stood at 47.3 percent, which was higher ($p<0.001$).

Table 1. Flu vaccination by the general characteristics.

Characteristic	Classification	Influenza vaccination		χ^2	p
		Yes	No		
Year	2014	307(33.3)	616(66.7)	3.838	0.281
	2015	340(37.4)	569(62.6)		
	2016	320(35.4)	584(64.6)		
	2017	330(36.5)	574(63.5)		
Sex	Man	584(33.9)	1138(66.1)	4.205	0.041
	Woman	713(37.2)	1205(62.8)		
Age group	20	143(25.5)	417(74.5)	478.143	0.000
	30	202(34.6)	382(65.4)		
	40	181(21.3)	667(78.7)		
	50	285(30.9)	637(69.1)		
	60	274(57.2)	205(42.8)		
	70	212(85.8)	35(14.2)		
Education	Elementary	187(69.8)	81(30.2)	222.955	0.000
	Middle	175(53.5)	152(46.5)		
	High	450(33.6)	888(66.4)		
	College	485(28.4)	1222(71.6)		
Marital status	Married (spouse)	977(37.4)	1637(62.6)	83.248	0.000
	Married (spouse) X	164(49.4)	168(50.6)		
	Single	156(22.5)	538(77.5)		
House incom	<200	220(53.7)	190(46.3)	82.447	0.000
	200-299	240(39.2)	372(60.8)		
	300-399	274(33.8)	536(66.2)		
	400-499	197(33.7)	387(66.3)		
	500-599	143(32.0)	304(68.0)		
	600<	223(28.7)	554(71.3)		

Economic activity	Yes	687(29.2)	1664(70.8)	118.944	0.000
	No	610(47.3)	679(52.7)		

3.2. Self-rated health level according to the implementation or non-implementation of flu vaccination

Concerning self-rated health level according to the implementation or non-implementation of flu vaccination, the respondents who weren't vaccinated got 2.68 and found themselves to be in better health ($p < 0.001$) <Table 2>.

Table 2. Self-rated health level according to the implementation or non-implementation of flu vaccination.

Characteristic	Classification	Subjective health status
Influenza vaccination	Yes	2.87±0.89
	No	2.68±0.76
	t / p	6.430(0.000)

4. Discussion

It's reported that influenza is contracted by three to five million people all over the world, and that it is a disease from which approximately 30 thousand people die. That is found to have occurred in about 10 percent of adults and in about 30 percent of little children every year[8]. In addition, the World Health Organization designates pregnant women, children aged between six months and five years, senior citizens aged 65 and over, chronic patients with chronic diseases and health care workers as priority groups in need of vaccination[7]. But the vaccination rates of adult people in general are still around 30 percent, which is quite low[9].

Accordingly, this study attempted to figure out the characteristics of flu vaccination among the local residents and the relationship between the vaccination and self-rated health awareness. The findings of the study were as follows:

As for flu vaccination rates by gender, the rate was higher among the women than the men. This coincides with the finding of Byeon, et. al.'s 2016 investigation[10], and the reason seems that the rate of women becomes remarkably

higher among senior citizens aged 65 and over. By age, the rate was highest among the respondents in their 70s, followed by those in their 60s and those in their 30s. This is a little different from the findings of most studies that flu vaccination rates increase with age[11][12][13].

The rates were higher among the respondents who were less educated and whose income levels were lower, and this was the same as the finding of Lee & Jeong's study[14] that flu vaccination rates were higher when educational levels and income levels were lower. It's not possible to reach an accurate conclusion because the findings of studies on the relationship between academic credential and flu vaccination rates are different to a certain degree.

Vaccination shouldn't be neglected as it is to improve one's overall health awareness, not just his or her immunity. In this study, the subjects who were vaccinated found themselves to be healthier. Kim, et. al.'s study[15] found that those who are vaccinated are more concerned about their health and find themselves to be in better health, which is similar to the finding of this study.

To prevent the flu, it's more important than anything else to be vaccinated against it to improve the immunity of the body, and what matters equally is to wash one's hands thoroughly to ensure personal hygiene. As influenza vaccination is no longer a personal matter but a social issue, the government should try to make vaccination recommendations to more people or increase the number of those who are eligible for free vaccination.

5. Reference

5.1 Journal articles

- [3] Jo HS. Factors Associated with Influenza Vaccination Behavior among High-risk Adults. *Korean Journal of Health Education and Promotion*, 19(2), 127-138 (2002).
- [4] Kim WJ. Senescence Preventive Vaccination. *The Korean Journal of Medicine*, 76(2), 310-319 (2010).
- [7] Kim JH & Choi EH & Park SE & Kim YJ & Jo DS & Kim YK & Eun BW & Lee JN & Lee SY & Lee

- HJ & Kim KH & Kim KH. Recommended Immunization Schedule for Children and Adolescents: Immunization Guideline Released by the Korean Pediatric Society in 2015. *The Korean Journal of Pediatrics*, 59(12), 461-465 (2016).
- [10] Byeon GR & Hur YI & Kang JH & Park HA & Kim KW & Cho YG & Shin KE & Kang BH. Influenza Vaccination Status in Korean Adult Population in Relation with Socioeconomic and Medical Factors. *The Korean Journal Health Promotion*, 16(1), 20-31 (2016).
- [11] J. Dower & M. Donald & N. Begum & S. Vlack & I. Ozolins. Patterns and Determinants of Influenza and Pneumococcal Immunization among Adults with Chronic Disease Living in Queensland. *Australia Journal Vaccine*, 29(16), 3031-3037 (2011).
- [12] Schoefer Y & Schaberg T & Raspe H & Schaefer T. Determinants of Influenza and Pneumococcal Vaccination in Patients with Chronic Lung Diseases. *Journal of Infection*, 55(4), 347-352 (2007).
- [13] Elga MM & Valentin HB & Pilar CG & Angel GM & Rodrigo JG. Influenza Vaccination among Persons with Chronic Respiratory Diseases Coverage Related Factors and Time-trend 1993-2001. *The Royal Institute of Public Health*, 121(2), 113-121 (2007).
- [14] Kee SY & Cheong HJ & Chun BC & Kim WJ. Influenza Vaccination Coverage Rate and Factors Associated with Vaccination in People with Chronic Disease. *Journal Infection and Chemotherapy*, 43(5), 406-411 (2011).
- [15] Kim YH & Heo EJ & Lim HS & Park EJ. A Study on the Impact of Health Belief Model on the Prevalence of Influenza Vaccination Intention. *Journal Humanities and Social Science*, 8(5), 149-166 (2017).

5.2. Additional references

- [1] Korea Centers for Disease Control and Prevention (2015).
- [2] <http://www.segye.com/> (2018).
- [5] Korea Centers for Disease Control and Prevention. 2017 National Influenza Vaccination Supported Project Management Guideline. 1st ed. Korea Centers for Disease Control and Prevention (2017).
- [6] <http://news.naver.com/> (2017).
- [8] <http://www.who.int/> (2014)
- [9] <http://www.cdc.gov/> (2015)

Lead Author

Park Chung-mu / Dongeui University Professor
B.A. Inje University
M.A. Inje University
Ph.D. Inje University

Research field

- Luteolin and Luteolin-7-O-glucoside Strengthen Antioxidative Potential through the Modulation of Nrf2/MAPK Mediated HO-1 Signaling Cascade in RAW 264.7 Cells, *Food Chemistry and Toxicology*, 65 (2014).
- TOP 1 and 2, Polysaccharides from *Taraxacum Officinale*, Inhibit NFκB-mediated Inflammation and Accelerate Nrf2-induced Antioxidative Potential through the Modulation of PI3K-Akt Signaling Pathway in RAW 264.7 Cells, *Food Chemistry and Toxicology*, 66 (2014).

Major career

- 2011~2013. Inje University College of Medicine, Research Professor
- 2013~present. Dongeui University, Assistant Professor

Corresponding Author

Yoon Hyun-seo / Dongeui University Professor
B.A. Korea Nation Open University
M.A. Inje University
Ph.D. Inje University

Research field

- Inhibitory Effects of Coffee Beans on Dental Carries Causing *Streptococcus Mutans* Activity, *International Journal of Clinical Preventive Dentistry*, 11(3) (2015).
- Dental Fear Level according to Oral Symptom Awareness in College Students, *Journal of the Korea Academia Industrial Cooperation Society*, 17(12) (2016).

Major career

- 2013~present. Gyeongsangnam-do Community Health Survey, Associate Responsible Professor
- 2015~present. Infection Disease FMTP, Cooperation Researcher

Publication state: Japan
ISSN: 2189-7603

Publisher: J-INSTITUTE
Website: <http://www.j-institute.jp>

Corresponding author
E-mail: leejh@kwu.ac.kr

Peer reviewer
E-mail: editor@j-institute.jp

<http://dx.doi.org/10.22471/disaster.2018.3.1.14>

© 2018 J-INSTITUTE

The Relations of NURSING Student's Problem Solving Ability, Nurses' Image and Leadership for Patients Safety

Lee Jin-hee

Kwangju Women's University, Gwangju, Republic of Korea

Abstract

The purpose of this study is to investigate the relationship between the nursing students' problem solving skills, nurse image and leadership for patient safety by conducting a survey against nursing students of a university. A sample included 241 nursing students enrolled at a regional university's nursing program during November 3 to 7, 2014. Data were analyzed using mean, t-test, ANOVA, correlation with SPSS 21.0. The mean scores turned out to be 3.36, 3.73, 3.68, for problem solving skills, nurse image and leadership. There were significant mean differences in problem solving skills according to application motivation and a school record. There were significant mean differences in the nurse image according to satisfaction with nursing as major and clinical training. There were significant mean differences in leadership according to application motivation, satisfaction with nursing as major and personality. Significant positive correlation among problem solving skills, nurse image and leadership were found. This findings indicate that in order to enhance problem solving skills for patients safety, it would be necessary to develop programs that account for factors related to improving the nursing students problem solving skills for the patient safety based on the results of this study.

[Keywords] Patient Safety, Problem Solving Skills, Nurse Image, Leadership, Nursing Student

1. Introduction

1.1. Need for study

The drastically evolving medical field requires a lot of skills from nurses, the consciousness of the health of the subjects has risen, and the demand for high quality medical services is increasing[1]. In addition, due to the social interest in patient safety, enhancing the medical service providers' capacity to manage patient safety is called for[2].

Patient safety means "reducing the risk of unnecessary health related harms to the minimum possible" WHO(2009), which requires that medical personnel use patient safety principles and knowledge to provide safe health care[3].

Problem solving skills have the greatest impact on patient safety competence[4], and due to the nature of nursing students related to employment,

problem solving skills are an important task for providing safe medical care to patients and solving complex problems in future clinical practices[5].

The Oxford dictionary defines problem solving as 'a process of finding solutions to difficult or complex problems, and problem solving skills are the collective skills of individuals to eliminate obstacles that cause problems in a given state'[6]. Reviewing previous studies on problem solving skills, the skills to solve problems enhanced at the time of application of team-based learning[7], and problem-based learning(PBL)[8], further to enhancement after implementing integrated simulation training[9].

Leadership is a characteristic that a leader must possess, and is the technology required in every place of life, while being life skills that everyone should have in order to live well and improve their

community and society[6]. Reviewing previous studies on leadership, there is a positive correlation between self-leadership and clinical performance capability[10], self-leadership has an adjustment effect on the relationship between nurses' self-image and nursing performance[11], and transformative leadership can maximize organizational performance[12].

The nurse image refers to the professional, traditional, social impression or beliefs and nurse's prospects as a profession based on a combination of nurse's beliefs, thoughts and impressions inherent in the individual's thoughts[13]. For the study of nurse image, 75.5% of the factors influencing the formation of nurse image were called nurses' appearance at the hospital[14], 'kindness of nurse', and 'nurse's consideration of patient' carried the highest score[15], the higher the traditional image factor was, the higher the satisfaction of clinical practices[12], the nurse image and self-esteem were statistically correlated[16]. In addition, the 'negative perception of hospital nurses after clinical practice' was surveyed as the largest reason for career change[17].

It was reported that the problem solving skills of nurses has the greatest effect on patient safety competence, however, a study on problem solving skills of nursing students would require a study related to the problem solving skills following an approach in the learning aspect.

1.2. Purpose of study

The purpose of this study is to understand the relationship between problem solving skills, nurse image, and leadership of nursing students, whose details are as follows.

First, the problem solving skills, nurse image, and leadership of nursing students are identified.

Second, the problem solving skills, nurse image, and leadership according to general characteristics of nursing students are identified.

Third, the correlation between problem solving skills, nurse image, and leadership of nursing students is identified.

2. Research Method

2.1. Research design

The purpose of this study is to investigate the relationship between problem solving skills, nurse image, and leadership of nursing students.

2.2. Research subject

In this study, for the students who are enrolled in a nursing department of a university, when a minimum median effect size of .15, a power of .95, and a significance level of .05 using the G*Power 3.1.9.2 program were used, a minimum of 199 questionnaires were required, 243 copies of the questionnaires distributed in consideration of response rate and dropout rate were collected, and the responses were used for the complete 241 copies for the data analysis.

2.3. Data collection and ethical considerations

The data collection period ran from November 3, 2014 to November 7, 2014. The purpose of the study explained, further to explaining the confidentiality, anonymity, refusal of participation, and possible interruption of participation, among others, followed by obtaining consent from the subjects on the study to conduct self-reporting survey questionnaire. The response time was about 10 to 15 minutes, and a gift was offered.

2.4. Research tools

2.4.1. Problem solving skills

The problem solving skills tool used 12 items developed by Jung Tae-young(2011) using the research tools developed by Warner(2007) and adapted by PSI Consulting Co., Ltd. for diagnosing problem solving skills. The tool consists of the 3 factors of 4 horizontal thinking questions, 4 recognition and judgment questions, and 4 alternative evaluation and decision questions, on the Likert 5 point scale of 'Not at all' for 1 point to 'Very highly' for 5 points, and so, the higher the score, the higher the problem solving skills.

2.4.2. Nurse image

The nurse image total average measurement tool developed by Kang Hye-young et al.(2003)

was used. This tool consists of 6 items of professional image, 6 items of traditional image, 3 items of nurses' prospects as a profession, and 5 items of social image, on the Likert 5 point scale of 'Not at all' for 1 point to 'Very highly' for 5 points, and so, the higher the score, the higher the nurse image. In Kang Hye-young et al.'s(2003) study(for the reliability at the time of tool development), Chronbach's $\alpha = .940$ was provided, and Chronbach's $\alpha = .877$ was provided in this study.

2.4.3. Leadership

As for the leadership tool, the leadership diagnostic tool developed by the Korea Educational Development Institute[6] was used. This is comprised of 50 questions, with 5 factors of goal achievement skills, recreation skills, leadership skills, human relation skills and purposeful consciousness, on the Likert 5 point scale of 'Not at all' for 1 point to 'Very highly' for 5 points, and so, the higher the score, the higher the leadership skills. In [6] study(for the reliability at the time of tool development), Chronbach's $\alpha = .940$ was provided, and Chronbach's $\alpha = .939$ was provided in this study.

2.5. Data analysis

The data collected in this study were analyzed using the SPSS/WIN 21.0 program. The research subjects general characteristics, problem solving skills, nurse image, and leadership required yield and percentage, and the problem solving skills, nurse image, and leadership following general characteristics were analyzed by t-test and ANOVA. The correlation between problem solving skills, nurse image, and leadership were analyzed by using the Pearson correlation coefficients.

3. Research Results

3.1. General characteristics

The mean age of the participants was 20.52 years among the research participants. 38.6% of the respondents responded that 'easiness to secure employment' was their largest motivation, followed by 26.1% for 'aptitude and interest', and 22.4% for 'family recommendation'. Factors influencing the image of nurses were 'appearance of nurse during hospital visit' captured 33.6%, 'appearance of nurse during clinical practice' 22.4%, and 'mass media' captured 17.8%. The satisfaction level of nursing program was average with 46.9%, 'satisfied' was 41.9%, and 'dissatisfied' was 11.2% <Table 1>.

Table 1. General characteristics of participants(n=241).

	Characteristics	n(%) or M±SD
Age(yrs)		20.52±2.41
Grade	1 st	61(25.3)
	2 nd	62(25.7)
	3 rd	58(24.1)
	4 th	60(24.9)
Application motivation	Aptitude and interest	63(26.1)
	According to grade	15(6.2)
	Persuaded by family	54(22.4)
	Get a job	93(38.6)
	To serve	11(4.6)
	Except	5(2.1)
Having relation nurse	Yes	113(46.9)
	No	128(53.1)
Health status	Poor	12(5.0)

	Moderate	88(36.5)
	Healthy	141(58.5)
A school record	Low(below3.0)	22(9.1)
	Middle(3.0~below4.0)	175(73.6)
	High(over 4.0)	44(18.2)
Religion	None	146(60.6)
	Christian	62(25.7)
	Buddhism	9(3.7)
	Catholic	21(8.7)
	Except	3(1.2)
Most influencing events	Mess media	43(17.8)
	Book	6(2.5)
	Visit a hospital	81(33.6)
	From relation nurse	39(16.2)
	From nurse during clinical training	54(22.4)
	From professor's mention	17(7.1)
	Except	1(0.4)
Satisfaction with nursing as major	Unsatisfaction	27(11.2)
	Moderate	113(46.9)
	Satisfaction	101(41.9)
Satisfaction with clinical training(3 rd -4 th)	Unsatisfaction	25(21.2)
	Moderate	49(41.5)
	Satisfaction	44(37.3)
Personality	Positive	214(88.8)
	Negative	27(11.2)
Interpersonal relationship	Introvert	31(12.9)
	Moderate	117(48.5)
	Outgoing	83(34.4)
	Very outgoing	10(4.1)

3.2. Comparison of nurse image, leadership, problem solving skills according to general characteristics

As for the nurse image according to general characteristics, the group of 'average or above' to 'satisfied' in the 'major program's satisfaction level' was higher than that of 'average or below' to 'dissatisfied'(F=5.45, $p<.01$), and the same went true for 'satisfaction level for clinical practice'(F=5.51, $p<.01$). Leadership was higher in the 'motivation for application' than

'interest and aptitude', 'service' group than 'grades', 'family recommendation', and 'easiness to secure employment' group(F=3.43, $p<.01$), and those who answered 'positive' in 'personality' were higher than those in 'negative'(F=3.13, $p<.01$). Problem solving skills were than higher than the aforesaid group in 'motivation for application'(F=3.23, $p<.01$), and the group of 'average or above' to 'satisfied' in the 'school grades' was higher than that of 'average or below' to 'dissatisfied'(F=4.58, $p<.01$) <Table 2>.

Table 2. Differences of nurses' image, readership, problem solving skills by general characteristics.

Variables		Nurses' image	t/F (Scheffe)	Readership	t/F (Scheffe)	Problem solving skills	t/F (Scheffe)
		M±SD		M±SD		M±SD	
Grade	1 st	3.85±0.43	2.62	3.67±0.39	2.14	3.36±0.37	0.58
	2 nd	3.73±0.45		3.60±0.35		3.34±0.46	
	3 rd	3.64±0.44		3.65±0.45		3.32±0.48	
	4 th	3.68±0.43		3.78±0.44		3.43±0.62	
Application motivation	Aptitude and interest	3.79±0.39	1.26	3.82±0.37	3.43**	3.51±0.41	3.23**
	According to record	3.71±0.65		3.55±0.39		3.13±0.54	
	Persuaded by family	3.65±0.40		3.57±0.42		3.23±0.46	
	Get a job	3.70±0.48		3.65±0.41		3.35±0.52	
	To serve	3.93±0.27		3.89±0.39		3.58±0.44	
	Except	3.88±0.43		3.76±0.56		3.40±0.49	
Having relation nurse	Yes	3.78±0.44	1.74	3.68±0.37	-0.02	3.33±0.44	-1.10
	No	3.68±0.44		3.68±0.44		3.39±0.52	
Health status	Poor	3.75±0.49	0.37	3.45±0.48	2.44	3.39±0.55	0.04
	Moderate	3.69±0.43		3.67±0.39		3.36±0.42	
	Healthy	3.75±0.45		3.71±0.41		3.36±0.53	
A school record	Low(below3.0)	3.82±0.43	0.94	3.52±0.36	2.52	3.07±0.49	4.58* a<b,c
	Middle (3.0~below4.0)	3.70±0.43		3.69±0.40		3.38±0.50	
	High(over 4.0)	3.77±0.51		3.76±0.45		3.43±0.41	
Religion	None	3.74±0.43	1.65	3.65±0.43	0.68	3.37±0.46	0.09
	Christian	3.75±0.47		3.75±0.42		3.34±0.52	
	Buddhism	3.62±0.33		3.71±0.33		3.40±0.42	
	Catholic	3.56±0.45		3.69±0.22		3.33±0.62	
	Except	4.15±0.74		3.59±0.12		3.39±0.53	
Satisfaction with nursing as major	Unsatisfactory	3.52±0.43	5.45** a,b<b,c	3.50±0.39	6.09**	3.32±0.61	0.91
	Moderate	3.70±0.44		3.64±0.43		3.33±0.46	
	Satisfaction	3.82±0.43		3.78±0.38		3.41±0.49	
Satisfaction with clinical training (3 rd -4 th)	Unsatisfactory	3.44±0.38	6.44*	3.26±0.64	0.67	3.75±0.45	1.22
	Moderate	3.64±0.41		3.40±0.51		3.64±0.47	
	Satisfaction	3.81±0.44		3.40±0.56		3.79±0.41	
Personality	Positive	3.73±0.43	-0.19	3.71±0.40	3.13**	3.37±0.48	0.62
	Negative	3.74±0.55		3.45±0.43		3.31±0.55	

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

3.3. Relationship between nurse image, leadership, and problem solving skills

The subjects' problem solving skills were positively correlated with nurse image ($r = .255, p < .001$) and leadership ($r = .485, p < .001$).

There was a positive correlation between nurse image and leadership ($r = .353, p < .001$). That is, the higher the nurse image and leadership, the higher the problem solving skills, and the higher the nurse image, the higher the leadership <Table 3>.

Table 3. Correlation of nurses' image, readership, problem solving skills (n=241).

Characteristic	Nurses' image	Readership	Problem solving skills
Nurses' image	-		
Readership	.353***	-	
Problem solving skills	.255***	.485***	-

Note:*** $p < .001$.

4. Discussion

The factors that influenced the nurse image formation were in the order of nurse appearance during hospital visit, nurse appearance during clinical practice, and mass media. This was similar to the study in which 75.5% claimed the nurse appearance within hospital. The nurse image scores turned out to be high for the group of 'average or above' to 'satisfied' in the 'major programs satisfaction level' representing identical results as in Gu & Lee's study[18], and the higher the satisfaction level of clinical practice, the higher the nurse image scores representing the identical results as in Lee & Kim & Kim's(2005) study.

Leadership was different according to nursing application motivation, major program's satisfaction level, and personality. In the nursing application motivation, the student who answered 'aptitude and interest' had the highest leadership, and 'aptitude consideration' was higher than 'other people's recommendation'[19]. The results of the self-leadership research for major programs satisfaction level were identical to the results of the study that the higher the major programs satisfaction level, the higher the self-leadership[20].

This suggests that students who are satisfied with their major are more likely to participate in school life involving classmates and participate actively in leadership activities. In terms of personality, sincerity, extroversion, and openness have a great influence on self-leadership[21], and in this study also, the students who answered their personality as 'positive' showed high leadership.

Problem solving skills demonstrated differences in the nursing program application motivation and grades, and so in the study of Yang & Sim[22] who studied problem solving skills and nursing application motivation for nursing students, 'consideration of aptitude' had higher problem solving skills than 'consideration of aptitude' or 'other peoples recommendation', and grades were influential[23][9] showed similar results to the study.

In this study, problem solving skills showed a positive correlation with leadership and nurse image. This is in support of the research results of Kim & Kang[24], and Kim & Kim & Lee[23], and Lee & Kim & Choi[25], who reported a positive correlation between problem solving skills and self-leadership in nursing students. The nurse image and problem solving skills were also found to have a positive correlation, however, it was difficult to find the studies on the relationship between nurse image and problem solving skills, and so in view of the studies that the higher the satisfaction of the major, the higher the problem solving skills, along with the studies that higher the nurse image, the higher the major program's satisfaction level[18][26], it seems that the nurse image and problem solving skills are not unrelated to nursing students.

In this study, nurse image and leadership were positively correlated, however, it was difficult to find the studies on the relationship between nurse image and leadership, and so in view of the studies that the higher the satisfaction of the major, the higher the problem solving skills[18][26], along with the study that higher the higher the major program's satisfaction level, the higher the self-leadership[20], it seems that it would be significant

to repeatedly study the relationship between the nurse image and leadership for the nursing students.

As problem solving skills most influence the patient safety competency[4], and as result of this study, they are positively correlated to the nurse image and leadership, a method to educate nurse image and leadership to enhance the nursing students' problem solving skills, along with a program linked to the clinical practice competency and patient safety.

5. Conclusion and Suggestions

The purpose of this study was to investigate the problem solving skills, nurse image and leadership of nursing students and to clarify the relationship between them. The nurse image of nursing students differed according to the presence of nurses' relatives and satisfaction of nursing major. Leadership was varied according to nursing department's application motivation, satisfaction of nursing major and personality, and problem solving skills was different according to whether they had nurse relatives. The problem solving skills, nurse image, and leadership were positively correlated.

This study was conducted in a nursing department and requires caution for generalizing the results of this study, and the results of this study must be used to develop a program considering the factors related to the improvement of problem solving skills, and repeat studies to expand the subjects.

6. References

6.1. Journal articles

- [1] Son YJ & Song YA. Effects of Simulation and Problem-based Learning Courses on Student Critical Thinking Problem Solving Skills and Learning. *The Journal of Korean Academic Society of Nursing Education*, 18(1), 43-52 (2012).
- [2] Jung J & Seo YJ & Mam EO. Factors Affecting Patient Safety Management Activities at Nursing Divisions of Two University Hospitals. *Korean Journal of Hospital Management*, 11(1), 91-109 (2006).
- [3] Walton MM & Shaw T & Barnett S & Ross J. Developing a National Patient Safety Education Framework for Australia. *Quality and Safety in Healthcare*, 15(6), 437-442 (2006).
- [4] Kim HS & Han SJ. The Survey on the Influence of Clinical Nurse's Critical Thinking Disposition Problem-solving Skill and Self-efficacy on Patients Safety Competencies. *Journal of the Korea Academia-Industrial Cooperation Society*, 17(6), 598-608 (2016).
- [5] Kang SJ & Kim EJ & Shin HJ. Convergence Study about Problem-based Learning and Self-directed Learning Ability Problem Solving Skills Academic Self-efficacy Motivation toward Learning of Nursing Students. *Journal of the Korea Convergence Society*, 7(2), 33-41 (2016).
- [7] Kim SO & Kim SM. Effect of Team-based Learning Applying for Nursing Students on Critical Thinking Ability Problem Solving Skills and Communication Ability. *Journal of Korean Data Analysis Society*, 18(2), 1151-1161 (2016).
- [8] Kang SJ & Kim EJ & Shin HJ. Convergence Study about Problem-based Learning and Self-directed Learning Ability Problem Solving Skills, Academic Self-efficacy Motivation toward Learning of Nursing Students. *Journal of the Korea Convergence Society*, 7(2), 33-41 (2016).
- [9] Moon MY. Effects of Convergence-based Integrated Simulation Practice Program on the Clinical Decision Making Problem Solving Process Clinical Competence and Confidence of Core Fundamental Nursing Skill Performance for Nursing Students. *Journal of Digital Convergence*, 15(7), 271-284 (2017).
- [10] Jang KA & Lee HS. Factors Affecting Clinical Competency of Dental Hygiene Students. *Journal of the Korea Convergence Society*, 6(4), 177-186 (2015).
- [11] Min S & Jeong YJ & Kim HS & Ha SY & Ha YJ & Kim EA. The Moderating Effect of Self-leadership in Relationship between Self-image and Work Performance of Nurses. *Journal of Korean Academy of Nursing Administration*, 15(3), 355-364 (2009).
- [12] Jang KS & Park SJ. Effect of Action Learning Approaches on Learning Outcomes in Nurs-

- ing Managements Courses. *Journal of Korean Academy of Nursing Administration*, 18(4), 442-451 (2012).
- [14] Kang HY & Kim MS & Kim JH & Kim HS & Park MH & Park YJ & Song NH & Lee NH & Jun HK. A Survey on Public Image on Nurse(s): Based on Teacher Broadcast Legal and Administrative Official at a Local City. *Chonnam Journal of Nursing Science*, 6(1), 109-124 (2001).
- [15] Lee SH & Kim SY & Kim JA. Nursing Students' Image of Nurse and Satisfaction with Clinical Practice. *The Journal of Korean Nursing Administration Academic Society*, 10(2), 219-228 (2005).
- [16] Choi J & Ha NS. The Relationship among Image of Nurses Self Esteem and Professional Socialization in Nursing Students. *Journal of Korean Academy of Nursing Administration*, 15(1), 54-63 (2009).
- [18] Gu HJ & Lee OS. The Correlation between Nurse's Image Biomedical Ethics and Professionalism in Nursing Students. *Journal of Korea Academia Industrial Cooperation Society*, 16(11), 7356-7366 (2015).
- [19] Kang HS & Kim YY. Influence of Self-efficacy and Critical Thinking Disposition on Self-leadership of Nursing Students. *Journal of Korea Academia-Industrial*, 18(5), 617-625 (2017).
- [20] Kim MS. The Influence of Personality Characteristics and Decision Making Type on Self-Leadership of Nursing Students. *Journal of Korean Academic Society Nursing Education*, 22(4), 441-451 (2016).
- [21] Kim MS. The Influence of Personality Characteristics and Decision Making Type on Self-leadership of Nursing Students. *Journal of Korean Academic Society of Nursing Education*, 22(4), 441-451, (2016).
- [22] Yang SH & Sim IO. Relationship between Problem Solving Skills Critical Thinking Disposition Creativity Self Efficacy and Nursing Process Competence of Nursing Students. *Journal of The Korea Contents Association*, 16(5), 612-622 (2016).
- [23] Kim JH & Kim KJ & Lee SH. Factors Influencing Problem Solving Skills of Nursing Students. *Journal of Digital Convergence*, 15(4), 295-307 (2017).
- [24] Kim JH & Kang HL. Relationships among Critical Thinking Disposition Problem Solving Skills and Self-leadership of Nursing Students. *Journal of Learner Centered Curriculum and Instruction*, 17(18), 435-450 (2017).
- [25] Lee KE & Kim SM & Choi EH. Problem Solving Ability Learning Flow and Debriefing Satisfaction According to Self-leadership of Nursing Students Participated in Simulation Training. *Journal of Learner Centered Curriculum and Instruction*, 17(2), 219-234 (2017).
- [26] Ka MJ & Kim S & Kim YK & Nam SJ & Oh LM & Lyuck JS & Lee HI & Choi M & Choi HM & Heo DE. Nursing Students' Image of Nurse and Satisfaction with Their Major. *Health and Nursing*, (44), 1-15 (2010).

6.2. Thesis degree

- [17] Jung KS. Factors Influencing Career Types and Their Changes among Male Nursing Students. Dong-A University, Master's Thesis (2014).

6.3. Books

- [6] Jung HU & Park BG & Choi SW & Kang IG. A Study to Develop the Diagnostic Scale of Leadership. Korean Educational Development Institute (2003).
- [13] Kalisch PA & Kalisch BJ. Careerist toward a New Ideal. The Changing Image of the Nurse Addison-wesley (1987).

Lead Author

Lee Jin-hee / Kwangju Women's University Assistant Professor

B.A. Chonnam National University
M.A. Chonnam National University
Ph.D. Chonnam National University

Research field

- The Convergence Study of Life Stress and Health Clinic User Satisfaction in Female Students: Focused on the One Women's University, Journal of the Korea Convergence Society, 7(5) (2016).
- Change Nursing College Students' Problem Solving Ability, Nurses' Image and Leadership after Management Clinical Practice, Journal of Oil & Applied Science, 35(1) (2018).

Major career

- 2015~2016. Korean Data Analysis Society, An Essay Examiner
- 2017~present. Kwangju Women's University, The Dean of the Nursing Department

Publication state: Japan
ISSN: 2423-8260

Publisher: J-INSTITUTE
Website: <http://www.j-institute.jp>

Corresponding author
E-mail: pkb5032@kiu.kr

Peer reviewer
E-mail: editor@j-institute.jp

<http://dx.doi.org/10.22471/disaster.2018.3.1.22>

© 2018 J-INSTITUTE

The Development Guidelines for Anti-Earthquake DISASTER Training

Park Ki-bum

Kyungil University, Gyeongsan, Republic of Korea

Abstract

Purpose; The purpose of this study proposes training steps in preparation of multiple earthquakes disasters and how to plan training situation scenarios reflecting regional characteristics in response to frequent occurrence of earthquakes in Korea these days. There was a series of earthquakes with the subsequent aftershocks of magnitude 5.0 in Kyung-ju and Pohang in Korea in 2016 and 2017, which resulted in a lot of damages. The earthquake disaster is what Korea has ever never experienced and we are defenseless for response training by the government institutions and public entities as well as the technologies for preparing disaster. However, in the wake of the earthquake in 2016, the importance of training for earthquake has been appreciated and a host of multiple earthquake disaster drills has been conducted in the Safety Korea Training under the control of the Ministry of Public Administration and Security. However, due to lack of understanding on earthquake disasters and lack of experiences of earthquake disaster drills, the drills still remains unpractical. In particular, more jobs are required to establish scenarios explaining from preparation to training. This study presents the 10 steps of PDCA CYCLE for multiple earthquake disaster training. In preparing the drills, the study suggests training for the response situation and making improvements to update the manual for better next drills over time. Earthquake disaster is getting worse through the complicated and continuous situations over time. Considering these earthquake disaster characteristics, characteristics such as weather, time, and season are important variables in determining the response directions. In order for efficient drills reflecting local characteristics, a training situation scenario is needed to take the characteristics of the earthquake disaster, the current status of the region, the characteristics of the characteristics of the facilities into account so as to create a complex disaster situation in response to an earthquake. In this study, we propose a method to set weather, time, and seasonal characteristics and to estimate the damage situation reflecting the surrounding facilities and the affected area in order to create a situation scenario that can cope with over time accordingly. The situation scenario is presented as an example of the Ulsan metropolitan city located on the tip of Southeast Korea. All the examples are based on the damage situations and responding situations are provided in accordance with the Site Action Manual and the Earthquake Disaster Manuals kept by each organization. It is believed that the 10 steps for PDCA CYCLE training and the damaged situation scenario proposed in this study will be conducive to the trainers in charge of preparing for the complex earthquake disasters and simulation scenarios.

[Keywords] *Disaster, Development, Earthquake, Training Scenario, Training Guide*

1. The Necessity for Earthquake Disaster Training

On Sep. 12, 2016, at 7:44 pm, a 5.1-magnitude earthquake hit Kyung-ju in Kyung-buk province. After 50 minutes, a 5.8-magnitude earthquake occurred and the people could

feel the shock nationwide. The earthquake left 31 people injured in Kyung-ju, 17 in Pohang and total damage was estimated at \$10.7 billion. There were 75 cases of damage to public facilities and 4011 cases of private property loss[1]. Also, more than 500 aftershocks caused the whole nation to tremble

with fear. An 5.4 magnitude earthquake occurred in Pohang, Kyung-buk Province, at 2 pm on Nov. 15, in 2017. There were over 70 after-tremors since then[2]. The Bank of Korea estimated a total of KRW 332.3 billion in calamity such as the delay of Korean SAT for a week, which is one of the biggest issues in Korea and the emergency evacuation of the resident for fear of collapse the apartment[3]. This kind of disaster is evidently unprecedented and the people have faced the new fear. The government took more rapid actions in response of the earthquake in Kyung-ju in 2016 than that in Pohang in 2017. The people evacuated much more rapidly through repeated drill in the wake of the earthquake in Kyung-ju in 2016. To minimize the effect, the most important thing is repeated practice. The evacuation drills by ordinary citizens are significantly improved. However, in the case of the trainers in public sectors still fall short of expectations. A seismic mishap is impossible to predict and multiple disasters occur concurrently. Repetitive and efficient training is essential to respond quickly and systematically to sudden disasters such as earthquakes and continuous and complex disasters. Currently guidelines for training personnel for general disaster drills are presented[4].

The purpose of this study is to develop the training guidelines for the personnel to prepare for anti- multiple disasters drills caused by the unprecedented seismic catastrophes. In order for the training personnel to prepare for earthquake, it is necessary to respond to the first damages and the subsequent secondary damages in efficient ways. In Korea, Safe Training is conducted annually targeted to the national government, local governments and public organizations under the host of Ministry of Public Administration and Security. This study develops and presents a process that prepares for step by step guidelines of earthquake disaster in the Safe Korea Train

2. The Development of Guidelines for Earthquake Disaster Drills

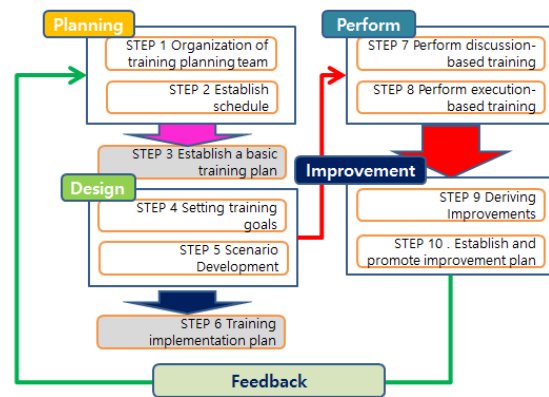
2.1. Setting complex disasters caused by earthquake

<Table 1> shows the results and analysis of the Safety Korea Train's earthquake disaster drills conducted by the central government, local autonomous entities, and public organizations

Table 1. Safety Korea training earthquake combined disaster training.

Disaster	Number of training (Include overlap)
Fire	90
Dam break	1
Nuclear damage	2
Marine pollution	3
Power accident	4

Figure 1. PDCA Cycle for earthquake drills.



Earthquake disaster includes a combination of effects such as fire, collapse of dam, nuclear power plants, toxic chemical leaks(marine pollution), electricity, water, gas, communication facilities and so on, which eventually leads to heavy casualties and victims. In addition, continuous after-shocks may bring about additional collapse of buildings and increase the number of victims. Therefore, the scenarios of anti-disaster drills reflecting all these situations are becoming important, but the understanding of scenarios for anti-earthquake drill and the ability of train personnel to develop scenarios are very insufficient.

The assumption of the damage situations after earthquake should be prioritized for response training of government organizations and public institutions according to the damage situations. For this reason, it is very important to set up a complex disaster situation

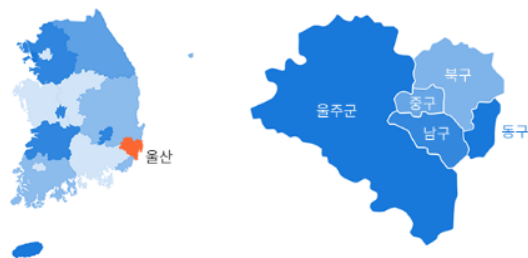
and develop the scenario accordingly.

2.2. Establishing 10 steps for complex disaster drills after earthquake

10 steps are set up to ensure that train personnel can prepare for the anti-complex disaster drills step by step.

- STEP1. Organization of training planning team
- STEP2. Establish schedule
- STEP3. Establish a basic training plan
- STEP4. Setting training goals
- STEP5. Scenario Development
- STEP6. Training implementation plan
- STEP7. Perform discussion-based training
- STEP8. Perform execution-based training
- STEP9. Deriving Improvements
- STEP10. Establish and promote improvement plan

Figure 2. The location of Ulsan city.



The above 10 steps present the steps to be taken by the train personnel that prepare for a complex disaster drill. Among the 10 steps, from STEP1 to STEP4 are for setting up organizations and training goals prior to the actual drills and the STEP5 is for creating scenarios to implement the drills. The STEP 6 is the final check stage before the actual training. The STEP7~STEP8 is for the debate training and putting the training to work. The STEP9~STEP10 is to find improvements for enhanced drills next time. This cycle is structured to evolve the drill as the training continues.

2.3. The development of a guideline for complex earthquake disaster scenarios for earthquake training.

In order to develop the scenarios for earthquake drills, the continuous damage effects

are set up for the government institutions or public agencies to response to them in the complex disaster situations. The complex disaster caused by earthquake can be different from place to place and the complex disaster situation can be set up depending on whether there are an industrial complex, a port, dams and nuclear power plants. The response may differ according to seasons, time and weather. This study explains the procedure for developing a complex disaster scenario for Ulsan metropolitan city in Korea. Ulsan Metropolitan City is located in the south-east of Korea and has a population of 1,195,761 people. It is the most suitable city to simulate all the earthquake disaster situations with mixed environment such as in-zone watersheds, chemical industrial complexes, 6 ports and nuclear power plants.

1)Setting the location of earthquake

- A spot 5km away from the south of Ulsan Metropolitan City

2)Setting the time of earthquake occurrence and weather conditions

- Jan. 7 at 7 am, minus 6 degrees, snowfall 6

3)The scale of the earthquake

- Scale 6.5

4)Possible elements of complex disaster in Ulsan

- Kori, Wolsung Nuclear Power Plant
- Mipo Port, Changsa Pohang, Ulsan New Port, Bang-a-jin Port, Jung-ga Port, Onsan Port
- Ulsan chemical complex, heavy industry complex, shipyard
- The collapse of old buildings, the collapse of the dam, the landslide
- Disable electricity, gas, water and communication
- Large fire
- The Tsunami on the East Coast
- Ground liquefaction, etc.

5)Setting goals and direction of training

- Set the detailed goals to be checked during the response drill against the Ulsan chemical complex fire and toxic chemical spill accidents caused by the earthquake

- Set response directions for complex disaster situation such as continuous disaster due to earthquake

6) Identification of the training place and possible mobilization organizations

- 13 collaboration functions of Ulsan city Disaster Prevention Headquarters

- Operating the organizations according to on-site Action Manual for earthquake response[5]

- Related organizations

7) Expectations the first damage scale and countermeasure

- Assumption of facilities damage, human injury, social damage

- As an example, Ulsan Hanhwa chemical fire caused by earthquake and 2 tons of harmful chemicals leakage into Duwon stream

- The Evacuation of the residents due to risk of building collapse at Doowon Plaza

- Risk of collapse due to dam leakage

- Description duties and roles of 13 collaborative functions based on the on-site Action Manual for Ulsan Earthquake Disaster

- Assuming continuous and complex disaster situations and describing 13 cooperation functions of Ulsan city disaster countermeasure headquarters and the response situations of the related organizations over time.

8) Expectation the secondary aftershock and additional effects and countermeasure

- As an example, roughly 150 people evacuated to the vicinity of a middle school for fear of the Duwon Plaze building collapse

- Destroyed over 100 buildings near Ulju-gun area

- Emergency recovery of Electricity, telecommunication in the Chungliang-Myun area

- Harmful chemicals flow into the outer river through Duwon stream

- Develop the continuous accidents caused by an additional explosion on the Hanhwa

Chemical fire site and describe the countermeasures of 13 cooperation functions of Ulsan city disaster countermeasure headquarters and other related organizations based on the On-site Action Manual for earthquake.

As the above examples, the example scenario of the Ulsan city earthquake, the types of complex disasters can be different according to regional characteristics, hence preparation for appropriate training and earthquake disaster scenarios are necessary. Only the training scenario reflecting regional characteristics can be an effective training. Also, participation of public officials familiar with the local situation in the assuming disaster scenario makes possible pre-detecting potential risks caused by earthquake and preventing unexpected disaster in advance.

In particular, weather conditions, time and seasonal conditions are also critical variables in the response of an earthquake disaster. In the case of the Pohang Earthquake in November in 2017, it was necessary to prepare for the cold of November, and what's worse the Korea SAT was delayed due to overlapping with the earthquake. In most cases, these seasonal and meteorological situations are not taken into account in the stage of preparation for drill and they must be considered in the development phase of situation scenarios

3. Conclusion

This study examines the training of earthquake disaster that is becoming increasingly important as earthquakes occur frequently in Korea recently. In the wake of the earthquake in 2016 and 2017, response to earthquake has become significant and the importance of anti-earthquake disaster has come to the fore. However, unlike other anti-disaster training, as earthquake drills take place under the complicated and continuous disaster, 10 steps for the PDCA CYCLE are presented for seismic training. Next, Ulsan is taken as an example of how to plan earthquake training scenario for training personnel. In the study, the scenarios describe the complicated and continuous situations due to the earthquake reflecting the regional characteristics. In the example of Ulsan city in the study, scenario is created reflecting the regional characteristics of Ulsan city, chemical industrial complex, dams and 6 ports. This study suggests guide-

lines to assist the training personnel to prepare for the disaster-relief drill in a more efficient and practical way. The study is also intended to acquire information on possibility of disaster in local regions and take belt and brace approaches for the future disaster.

4. References

4.1. Books

- [4] National Security Service. The Guideline for Training Staff for Preparation Conduct Evaluation of Anti-disaster Drill. National Security Agency (2016).
- [5] Ulsan Metropolitan City On-site Action Manual for Earthquake Ulsan Metropolitan City (2016).

4.2. Additional references

- [1] <http://100.daum.net/> (2016).
- [2] <http://ko.wikipedia.org/> (2018).
- [3] <http://www.ytn.co.kr/> (2018).

Author

Park Ki-bum / Kyungil University Professor
B.A. Yeungnam University
M.A. Yeungnam University
Ph.D. Yeungnam University

Research field

- Study on the Hydrologic Safety of Small Old Reservoir, Advanced Science and Technology Letters, 140 (2016).
- A Research for Flood Control Capability Evaluation of Aging Reservoir, Information, 20(5B) (2017).

Major career

- 2015~present. Ministry of Public Administration and Security, Safe Korea Training Central Evaluators
- 2017~present. Ministry of Public Administration and Security, Central Disaster Management Evaluators