

Awareness and Performance of Paramedics in Preventing toward Middle East Respiratory Syndrome Coronavirus Infection

Myeong- Jeong Chae¹, Jong-Geun Yun², Boyoung Kim³

¹Assistant Professor, Department of Nursing, Gwangju Women's University, Gwang-ju, Korea, ²Assistant Professor, Department of Emergency Medical Services Honam University, Gwang-ju, Korea, ³Associate Professor, College of Nursing, Gyeongsang National University, South Korea

Abstract

The purpose of this study is to examine the knowledge of Middle East Respiratory Syndrome Coronavirus (MERS), wearing of protective equipment and the performance in preventing MERS infection among paramedics and analyze correlations. The survey was conducted on 96 active paramedics in K city, South Korea. The data were analyzed using the SPSS 21.0 program using descriptive statistics, t-test, one-way ANOVA, Scheffe test and Pearson's correlation coefficient.

Through this analysis, it was found that higher knowledge of MERS resulted in higher scores in the actions to prevent infection. As such, it is necessary to raise the infection control performance of paramedics by reflecting strategies for 'preparedness' rather than 'response' in the training on MERS, which must focus on knowledge and infection prevention.

Keywords: Paramedics, MERS-coronavirus, knowledge, protective equipment, infection prevention.

Introduction

Middle East respiratory syndrome is a severe acute respiratory infection caused by the MERS^[1]. Since the first confirmed case was reported in Saudi Arabia in 2012, cases have been reported around the world and the death toll has been steadily increasing^[2]. In fact, it continues to occur in Korea, as there was a suspected case of MERS in September 2018^[3]. Similar to SARS, which hit Asia in 2003, there is still no cure or vaccine for the disease, which is accompanied by kidney failure along

with symptoms of severe acute respiratory diseases such as high fever, coughing and difficulty in breathing^[4].

Looking back at the outbreak of MERS in Korea in 2015, the system overseeing each component of the emergency medical system did not function properly during the outbreak and spread of MERS^[4]. This is because essential guidelines were missing and even the guidelines available were difficult to apply in the field^[5]. In addition, the infections were concentrated in medical environments and were highly prevalent among health and medical care workers^[6]. In particular, as paramedics have the most direct contact with active patients with infectious diseases before hospital treatment, they can be exposed to infectious diseases through contact with patients^[7]. For this reason, paramedics need to perform effective infection control actions to minimize their infections related to emergency medical care. In addition, they must conduct activities to prevent the spread of microorganisms in order to prevent exogenous healthcare-associated infections^[5]. Actions to prevent infection include hand hygiene, personal hygiene and

Corresponding Author:

Boyoung Kim

RN, PhD, PMHNP, Associate Professor, College of Nursing, Gyeongsang Institute of Health Science, Gyeongsang National University, Korea, 816-15 Jinjudaero, Jinju, 52727, Gyeongnam, South Korea

Phone: +82-55-772-8248

Fax : +82-55-772-8222

e-mail: bkimjhu@gmail.com

aseptic technique, invasive instrument management, wearing and removing protective equipment, disinfection and sterilization, quarantine and environmental management activities performed by paramedics^[8].

Monitoring and reporting the outbreak of infections are the starting point and backbone of infection control projects⁷ and these projects can be properly carried out by accurately identifying infection control problems inherent to paramedics. In addition, effective infection control can be achieved by monitoring the measures taken to address the problems and the results of education through continuous infection monitoring activities^[9]. However, there is a lack of research and education on infection control for paramedics. Although the safety management SOP (Standard Operating Procedures) standard for paramedics has been prepared and enacted to protect paramedics from infections and the importance of paramedic safety is being emphasized^[10-11], studies in Korea on infection control by paramedics before hospital treatment have only been performed by Yoon and Jung^[12]. As such, it is necessary to present the proper direction for infection control based on the reality of paramedics in Korea.

Therefore, the purpose of this study is to provide a basic data on infection control by examining the relationship between the knowledge of MERS, wearing protective equipment and the performance level of infection prevention for paramedics who are susceptible to infections at emergency sites.

Method

Study Participants and Data Collection: The participants in this study were selected from those who understood its purpose and objective and agreed to voluntarily participate in the study among active fire-fighting officers who entered the fire academy in K-area for retraining. To protect the participants, approval for this study was obtained from the university's bioethics review committee. We explained to the participants that the data will be only used for research in addition to their contribution to the research and the details and method of research. We also informed them that they could withdraw from the study and explained the anonymity and confidentiality of the data and that all data will be destroyed after the study. We considered the ethical aspect for the participants by receiving written consent to participate in the study. We distributed 100 questionnaires considering the recovery rate and collected 96 questionnaires for the final analysis.

Research Variables: Korean tools to measure the performance of MERS knowledge and actions to prevent infection have not yet been developed and the infection control protocol in Korea clinically applies the protocol developed by the Centers for Disease Control and Prevention (CDC)^[3]. Therefore, this study developed a questionnaire on MERS knowledge, wearing protective equipment and infection prevention performance after consulting with a licensed professor of emergency medicine based on the infection control guidelines for paramedics^[13], materials presented by the Korea Centers for Disease Control and Prevention, training materials for Korean paramedics to prevent MERS infection and MERS response integrated administrative guidelines¹⁴. The questionnaire has a total of 30 yes/no questions, including 10 questions about knowledge, 5 questions for protective equipment and 15 questions for infection prevention performance.

Data analysis: The data collected in this study were analyzed using the SPSS 21.0 program descriptive statistics, t-test, one-way ANOVA, Scheffe test and Pearson's correlation coefficient.

Result and Discussion

General Characteristics: The general characteristics of the paramedics are shown in Table 1 below. Out of 96 paramedics, 84 (87.5%) were male and 12 (12.5%) were female, so there about 3 times more male paramedics than female paramedics. In terms of age, 53 paramedics were under 29 (55.2%) and 43 were over 30 years old (44.8%). In terms of education, the paramedics consisted of 8 high-school graduates (8.3%), 36 university graduates (37.5%) and 52 college graduates (54.2%).

Performance of wearing protective equipment: The participants' performance of wearing protective equipment against MERS is shown in <Table 3>. The items with the highest performance level were 95.8% for 'wear N95 masks' and 'wear gloves,' while the item with the lowest performance level was 91.7% for 'wear gowns (protective coveralls) that cover the sleeves.' The use of protective equipment is the last defense to prevent harmful factors from entering the human body and here the average performance rate was high, at 93.7%.

Knowledge of MERS, wearing protective equipment and preventing infection according to general characteristics: The differences in knowledge of MERS, wearing protective equipment and preventing

infection according to the general characteristics of the paramedics are shown in <Table 3>. There were no differences according to gender, age and educational background. There was a statistically significant difference in wearing protective equipment according to the position or rank ($F=3.621, p<.031$) and the post-analysis showed that fire captains scored higher than fire fighters.

Relationship between Variables: The correlations between the participants’ knowledge of MERS, wearing protective equipment and preventing infection are shown in <Table 4>. The higher the knowledge of MERS, the higher the score for actions to prevent infection ($r=.216, p<.034$).

The MERS outbreak is a historical event which brought about a paradigm shift in Korea’s national infectious disease prevention and response system^[9]. The outbreak of MERS was prevalent in medical institutions and between humans⁴. In Korea, the spread of the MERS outbreak was attributed to a complex interplay of various individual factors including the lack of awareness by medical professionals, the culture of family nursing, the health care delivery system and the initial response system of the government. We will not be able to achieve the desired results when faced with a complicated crisis such as MERS with conventional medical knowledge alone. Therefore, the first step in building an effective infection prevention system against infectious diseases such as MERS is to enhance the awareness and related knowledge through

education in infection control guidelines based on the requirements of occupational roles and responsibilities, such as paramedics who experience direct contact with patients^[15].

In addition, in order to be able to operate an effective infection prevention system in the event of a pandemic, regardless of the prevalence of MERS epidemic, it is necessary to develop an effective educational program for specific guidelines in all areas regarding the prevention and management of radio waves and to introduce and apply it in paramedics practice^[16]. For example, measures should be developed to effectively train workers in MERS quarantine guidelines by implementing simulation-based training for MERS outbreak and regular training for wearing protective equipment, case management for MERS management according to MERS quarantine guidelines regularly updated by the Korea Centers for Disease Control^[17]. These changes are essential for the education of occupational groups in direct contact with patients by preparing strategies related to preparedness rather than response.

The limitations of this study include it having a design, possible reporting bias and being conducted in a single city in Korea with a small sample size limited to a single profession. Based on the results of this study, the following suggestions are made. Since the results of this study are limited to the paramedics in Korea, follow-up research should be conducted in other countries to allow for greater comparison.

Table 1. Subjects’ General Characteristics (N=96)

General characteristics	Sort	Number of people	Percent (%)
Gender	Male	84	87.5
	Female	12	12.5
Age	≤ 29	53	55.2
	≥ 30	43	44.8
Education	High-school graduate	8	8.3
	College graduate	52	54.2
	University graduate	36	37.5

Table 2. Performance of wearing MERS protective equipment (N=96)

Question	Performance level
Wear N95 masks	95.8
Wear gloves	95.8
Wear gowns (protective coveralls) that cover the sleeves	91.7
If necessary, wear goggles (when suspected patients cough, etc.)	92.7
If necessary, wear face masks (when suspected patients cough, etc.)	92.7
Total	93.7

Table 3. Knowledge of MERS, wearing protective equipment and preventing infection according to the general characteristics (N=96)

General characteristics	Type	Knowledge		Wearing protective equipment		Prevention	
		M±SD	t/F(p)	M±SD	t/F(p)	M±SD	t/F(p)
Gender	Male	10.95±1.18	.331	15.29±0.67	.585	5.31±0.88	-.090
	Female	10.83±1.03	(.741)	15.17±0.58	(.560)	5.33±0.65	(.928)
Age	Under 29	9.23±2.64	-1.090	60.70±6.78	-.585	61.54±7.01	-.232
	Over 30	9.69±1.74	(.277)	60.02±6.72	(.559)	61.84±9.16	(.817)
Education	High-school graduate	11.50±1.07	2.555 (.083)	15.63±1.41	1.286 (.281)	5.88±1.46	2.689 (.073)
	College graduate	10.71±1.11		15.23±0.58		5.17±0.58	
	University graduate	11.14±1.20		15.25±0.50		5.39±0.96	
Position (Rank)	Fire fighters	11.00±1.12	.603 (.550)	15.21±0.50	3.621 (.031) (a<b)	5.25±0.59	.174 (.841)
	Above fire captain	11.50±0.71		16.50±0.71		5.50±0.71	
	Other	10.80±1.10		15.27±0.72		5.33±0.84	

Table 4. Relationship between the knowledge of MERS, wearing protective equipment and preventing infection (N=96)

Category	Knowledge r (p)	Actions to prevent infection r (p)
Preventing infection	.216*(.034)	
Wearing protective equipment	.063(.543)	-.021(.837)

*p < .05

Conclusion

Our study shows that as paramedics have more knowledge of MERS, they had higher scores for preventing infection. Therefore, it is necessary to build an effective infection prevention system for infectious diseases by reflecting our knowledge of MERS and specific details on preventing infection in the education for occupational groups in direct contact with patients.

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