



Factors influencing preventive behavior against Middle East Respiratory Syndrome-Coronavirus among nursing students in South Korea[☆]



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ABSTRACT

Background: Middle East Respiratory Syndrome Coronavirus (MERS-CoV), an emerging infectious disease introduced in South Korea in 2015, spreads quickly through hospitals, and Korea became one of the major areas affected by the disease after the Middle East region. To stop the spread of an emerging disease, it is important to practice prevention guidelines correctly.

Objectives: The purpose of this study was to investigate factors influencing preventive behavior against MERS-CoV among Korean nursing students.

Methods: This is a cross-sectional study using a questionnaire survey. Data were collected from 429 nursing students from three colleges of nursing in Korea from June 25 to July 3 in 2015.

Results: Preventive behavior against MERS-CoV was affected mostly by attitude ($\beta = .243, p < .001$). Such behavior was also high in relation to the variables of perceived risk ($\beta = .232, p < .001$), older students ($\beta = .202, p < .001$), knowledge level ($\beta = .153, p < .01$), and female respondents ($\beta = .115, p < .05$).

Conclusion: Preventive behavior against emerging infectious diseases such as MERS-CoV was found to be affected most significantly by attitude and risk perception. It is crucial to provide nursing students with information or knowledge, but it is also important to help those in nursing education recognize that active preventive behavior can prevent this infectious disease and stop its spread.

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1. Introduction

In Korea, the first Middle East Respiratory Syndrome Coronavirus (MERS-CoV) patient was identified on May 20, 2015; from that time on, the disease spreads rapidly throughout the Korean society. By July 5, the number of patients definitely diagnosed with the disease had reached 186, and 33 (17.8%) of them had died (Korea Centers for Disease Control and Prevention, 2015). MERS-CoV was first detected in Saudi Arabia in 2012, and approximately 95% of cases have been detected in the Middle East region. The infection route has not been explained clearly, although its transmission through Arabian camels was reported in Saudi Arabia (Centers for Disease Control and Prevention, 2015). Most patients originally present with a severe acute lower respiratory infection, but some are asymptomatic or show a mild acute upper respiratory infection (Centers for Disease Control and Prevention, 2015).

Until the incidence of its first case, MERS-CoV was an unfamiliar disease in Korea. Accordingly, the spread of this infectious disease caused anxiety among the Korean people, an anxiety aggravated further by the news that infected patients had died. It has now become common

for people to wear masks on the street to prevent infection. Schools were gradually closed, various cultural events were canceled, and the number of tourists decreased. The spread of MERS-CoV had extensively impacted the Korean society, not only in the socio-economic aspect but also in individuals' daily lives (Jun, 2015; Lee and Yeo, 2015).

To stop the spread of an infectious disease, it is most important to observe the established prevention guidelines correctly. Nursing students in Korea theoretically learn the concept of universal precaution as their infection prevention curriculum in the Fundamental Nursing undergraduate course, where they also practice hand washing and the use of personal protective equipment. In addition, when nursing graduates become clinical nurses, they are educated on standard isolation precautions for each transmission route through facility programs for new nurses and continuing education programs on infection control. However, it is difficult for hospitals to maintain the resources needed to carry out, since the high cost of protective equipment for each transmission route is not covered by Korea's national health insurance (Jeong et al., 2008; Kim et al., 2001).

Currently, healthcare-associated transmission plays a pivotal role in the evolution of the MERS-CoV epidemic. Above all, nurses are mostly affected, a situation attributed to their prolonged, repeated, and close physical contact with patients (Maltezou and Tsiodras, 2014). Because nursing students complete their clinical practice coursework in hospital settings, they may also be exposed to patients and health care workers

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who are suspected of or diagnosed with MERS-CoV infection. Therefore, preventive behavior against MERS-CoV needs to be promoted among nursing students to limit the reach of the novel infectious disease in hospital environments. In this sense, it is necessary first to identify factors influencing nursing students' MERS-CoV preventive behavior.

Previous studies on MERS-CoV have mostly been medical research investigating infection cases, infection routes, or infection risk (Choi et al., 2015; Cowling et al., 2015; Hall et al., 2014; Hui et al., 2015; Maltezou and Tsiodras, 2014; Park et al., 2015). In Saudi Arabia, where the disease originated, research was conducted on health care workers' and ordinary people's knowledge and attitudes regarding MERS-CoV (Gautret et al., 2013; Khan et al., 2014). However, no study has analyzed factors influencing MERS-CoV preventive behavior among nursing students who are future health care workers.

In addition, according to previous studies, university students' preventive behavior against respiratory infectious disease such as SARS and H1N1 is affected by knowledge level (Brug et al., 2004; Choi and Yang, 2010; Hussain et al., 2012), attitude toward the disease (Choi and Yang, 2010), and risk perception (Brug et al., 2004; Hussain et al., 2012). However, previous studies did not identify if the three variables of knowledge, attitude, and risk perception are correlated with preventive behavior against respiratory infectious disease.

This study's researchers therefore composed a conceptual framework of knowledge, attitude, and MERS-CoV preventive behavior based on the KAP (Knowledge, Attitude, and Practice) model (Coreil, 1997), adding a concept of risk perception. The study is expected to identify whether knowledge, attitude, and perceived risk are correlated with MERS-CoV preventive behavior and to explain the integrated effect of these variables on MERS-CoV preventive behavior.

2. Methods

2.1. Design

This study used a cross-sectional descriptive research design. The study was conducted in two phases. First, a pilot study was conducted to test the feasibility and reliability of the measuring tools. After the pilot study's completion, the main survey was conducted to investigate factors influencing preventive behavior against MERS-CoV among Korean nursing students. The survey questionnaire consisted of 6, 15, 9, 1, and 10 questions concerning general characteristics, knowledge, attitude, perceived risk and preventive behavior against MERS-CoV, respectively.

2.2. Participants

Study participants were sampled through convenient sampling from nursing students attending 4-year nursing schools in Incheon, Iksan, and Busan in Korea. Data were collected from June 25 to July 3 in 2015.

The sample size was estimated using G-Power 3.1 (Faul et al., 2007). With $\alpha = 0.05$, effect size $f = 0.06$, power = 0.95, and number of predictors = 8 for linear multiple regression, the smallest required sample size was 387. However, to insure against elimination and the even distribution of participants among the conveniently selected three universities, 150 questionnaires were delivered to each school. In total, 432 questionnaires were recovered (response rate, 95.3%), and three incomplete questionnaires were excluded. Therefore, 429 questionnaires were used in analysis as valid data.

2.3. Measures

2.3.1. Knowledge about MERS-CoV

The researcher developed the MERS-related knowledge scale based on the MERS response guidelines provided by the Centers for Disease Control and Prevention (2015) and Korea Centers for Disease Control and Prevention (2015) and the questions used to survey health care

workers' knowledge in Saudi Arabia (Khan et al., 2014). This scale consisted of 16 items, and its content validity (CVI) was rated by two infection control nurse practitioners, one infectious disease specialist, and one nursing professor using a scale of 1 = not relevant to 4 = very relevant. One item that received 1 or 2 points was removed, and 12 nursing students who were not participants in the main survey were given the restructured 15-item scale as a pilot study to correct ambiguous phrases and words.

The 15 items included questions about the cause of MERS (3 items); symptoms and latent period (2 items); test, treatment, and prevention methods (7 items); and patient nursing guidelines (1 item); a high score indicated a high level of knowledge. A correct answer was given 1 point, an incorrect answer or "don't know" response was given 0 points, and the total score was converted into a percentile. The final CVI of the scale was 0.95, and its reliability (Kuder–Richardson 20) was 0.65 in the pilot study and 0.79 in the main survey.

2.3.2. Attitude toward MERS-CoV

The researcher developed the scale on attitude toward MERS-CoV by extracting 9 items from a review of previous studies (Brug et al., 2004; Choi and Yang, 2010; Hussain et al., 2012; Khan et al., 2014). Each item was answered on a 5-point Likert scale from "Not at all" (1) to "Absolutely yes" (5), and a high score meant that the respondent felt MERS-CoV was a serious issue and believed that preventive behavior would protect him or her against MERS-CoV infection.

When the validity of the scale was tested through factor analysis, two factors were extracted and labeled as belief in prevention and perceived severity. Ambiguous phrases and words were revised through a pilot study; the reliability (Cronbach α) of the tool was 0.79 in the pilot study and 0.86 in the main survey. On the other hand, the factors explained 66.481% of variance, and the reliability coefficient of each factor was 0.741–0.898, an acceptable level (Table 1).

2.3.3. Perceived risk of acquiring MERS-CoV

To rate the perceived risk of MERS-CoV, the researchers developed a descriptive 5-point scale (1 = "Not at all" to 5 = "Absolutely yes") to answer the statement, "I am worrying about being infected with MERS." The content validity of this scale was tested by two infection control nurse practitioners, one infectious disease specialist, and one nursing professor. A high score meant a high perceived risk of acquiring MERS-CoV.

2.3.4. Preventive behavior against MERS-CoV

Preventive behavior against MERS-CoV refers to the degree the respondent practices behavior to avoid becoming infected with the disease. The researcher developed the scale for this factor based on questions that Gautret et al. (2013) used to survey the performance of MERS prevention and the MERS response guidelines provided by the Korea Centers for Disease Control and Prevention (2015) for Korean people. The scale was tested by two infection control professors, two infection control nurse practitioners, and one infectious disease specialist, and its CVI was 0.90. This scale consisted of 10 items, including items focused on the reduced use of public places in daily living (6 items), the avoidance of people who are coughing (1 item), intensified cleaning and disinfection (1 item), hand washing (1 item), and discussion with people in one's environment about coping with the disease (1 item). Each item could be answered as "Performed" (1) or "Not performed"/"Not applicable" (0), and the total score ranged from 0 to 10. A high score meant a high performance of preventive behavior. The reliability (Cronbach α) of the scale was 0.76 in the pilot study and 0.85 in the main survey.

2.4. Procedure

Before data collection, this research was approved by the Institutional Review Board of G University in Korea (No. 1044396-201504-HR-029-

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