

# Implications for MERS Outbreak in South Korea

MyungHee Kim

*Liberal Arts College, Sahmyook University Seoul, 01795, Republic of Korea  
kmh@syu.ac.kr*

## **Abstract**

*The purpose of this study is to prevent possible recurrence of MERS by diagnosing the current status of South Korea's public healthcare system through literature review; and to present measures for public health system reinforcement by analyzing the roles and limitations of health authority standing on the frontline to prevent infectious disease from spreading, which were found in the entire process of dealing with the recent MERS outbreak in the country.*

**Keywords:** *MERS, Infectious Disease, Public Health Care System, Public Hospital, Publicness*

## **1. Introduction**

From May 2015 to July 2015, South Korea experienced the outbreak of MERS or Middle East Respiratory Syndrome Coronavirus (MERS-CoV), an epidemic disease geologically far away from the Arabian Peninsula. For about two months since then, a total of 186 MERS cases were identified in the country. 38 died and over 16,000 were isolated [1][2][3]. South Korea used to boast of its advanced medical healthcare system, but MERS dragged down it into an underdevelopment stage. Economic loss is estimated to reach about KRW 10 trillion. Noted reasons include the underdeveloped healthcare system without proper measures against infectious diseases and poor capacity of public healthcare institutions such as community healthcare centers and local medical centers [2][3].

In South Korea, public healthcare implements two functions of infectious disease treatment and care service for the poor [4]. For instance, in the event of a public healthcare risk such as MERS outbreak, the national public healthcare system must fulfill its role of connecting, coordinating and supporting the medical resources in affected areas to overcome the threat by using the whole capacity of the local community. Also, in the event of an infectious disease without an appropriate medicine and vaccine, the national public healthcare system should quarantine suspected patients to identify infected cases; isolate confirmed patients; and thoroughly control potential intra-hospital infection to minimize damage. However, most of the South Korean public medical institutions tend to have lower competitiveness than private sector hospitals in realizing publicness such as infectious disease prevention and treatment because of their continued operating deficit and purpose of public healthcare implementation.

To prevent any recurrence of MERS event, this study conducted literature review to diagnose the current status of South Korea's public healthcare system; examined the

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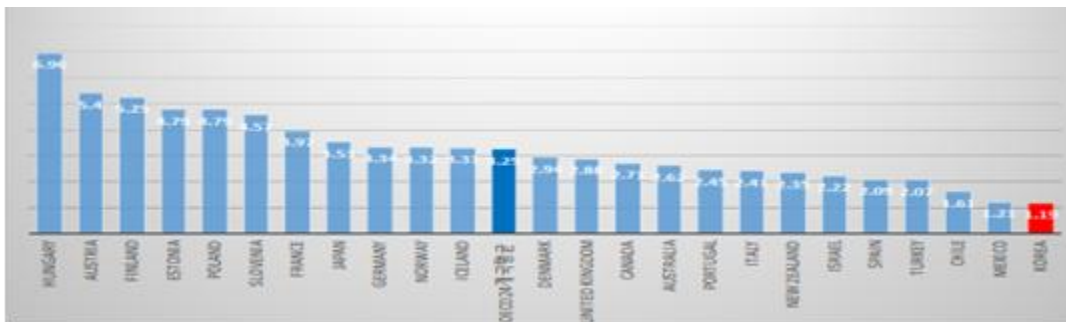
roles and limitations of healthcare authority standing at the forefront of preventing infectious disease from spreading, which had been noted during the whole process of MERS response with a view to present method of public healthcare system reinforcement. Accordingly diverse literature is analyzed.

## 2. Overview on South Korea’s public healthcare system

Government intervention is necessary in public healthcare for publicness and public goods realization. Article 2 of the Public Health and Medical Services Act established in 2000 stated that “all activities of the State, local governments, and of public and medical institutions to ensure all citizens equal access to medical services and to protect and promote their health” [5]. Accordingly, healthcare and medical institutions having the nature of publicness provide medical services to low-income class, the elderly, and the physically challenged; medical service, infectious disease control and preventive healthcare projects against special diseases such as tuberculosis and psychological disorders; and services for national health protection and improvement. According to Kovner, healthcare service is generally divided into personal health care services, community health services, and combined services. In terms of service providing party, the personal health care service targeting individuals are provided by the private sector; community health service for the general people, which accounts for a relatively large part, by the public sector; vaccination, TB, venereal disease control, infectious disease control, etc. are provided by the public and private sectors [6].

South Korea’s public healthcare service is characterized as, first, mainly targeting vulnerable regions and classes which cannot enjoy efficient medical service production or consumption if it is left to the market. Second, South Korean public healthcare service provide health promotion service, prevention against diseases and infectious diseases requiring responses at the national and local governmental levels. Third, the national government provides the service in direct intervention instead of leaving it to the private sector to guarantee the equity.

In 2011, South Korea recorded the lowest among the OECD countries in terms of the number of beds in public hospitals [7]. The number of beds per 1000 people was investigated in OECD member countries. As a result, South Korea was found to have 1.19 beds on average. The number is about 1/3 of the OECD average of 3.25, ranking the lowest behind Mexico.



**Figure 1. Number of public beds per 1000 people in OECD. 2011**

Source: OECD. Health at a Glance. 2011

Eighteen OECD countries allow hospitals for profit. Their profit beds accounted for 15% on average. The number of public hospitals’ beds was found to account for 77% of

the non-profit beds. The bed ratio of public hospitals is about 5 times as high as that of profit hospitals. In South Korea, the bed ratio of public hospitals is 12% of the total number of beds, representing poor public medical system among the comparison targets [8].

**Table 1. Bed ratio of public hospitals in countries with profit hospitals**

State	No. of beds in private sector hospitals		No. of beds in public hospitals	Total
	Profit	Non-profit		
<b>Germany</b>	30%	29%	41%	100%
<b>Italy</b>	28%	4%	68%	100%
<b>Chile</b>	27%	0%	73%	100%
<b>Poland</b>	27%	0%	73%	100%
<b>Mexico</b>	24%	0%	76%	100%
<b>France</b>	24%	14%	62%	100%
<b>Turkey</b>	19%	0%	82%	100%
<b>Spain</b>	18%	13%	69%	100%
<b>Australia</b>	17%	14%	69%	100%
<b>New Zealand</b>	13%	4%	84%	100%
<b>Israel</b>	12%	18%	71%	100%
<b>Austria</b>	12%	18%	70%	100%
<b>Portugal</b>	8%	20%	73%	100%
<b>Estonia</b>	5%	6%	89%	100%
<b>Finland</b>	5%	0%	95%	100%
<b>Denmark</b>	3%	3%	94%	100%
<b>Slovenia</b>	1%	0%	99%	100%
<b>Canada</b>	1%	0%	99%	100%
<b>Average of 18 OECD states</b>	15%	8%	77%	100%
<b>Korea</b>	0%	88%	12%	100%

Source: OECD. Health at a Glance. 2011

### 3. Development process of MERS from its outbreak to end

#### 3.1. MERS outbreak and spread

The first confirmed MERS case in South Korea was a person who had stayed in Bahrain from April 18 to May 3, 2015 to deal with crop cultivation business. The person arrived at the Incheon International Airport via Qatar on May 4 but showed no specific symptom upon arrival. On May 11, about a week later, he developed the first symptom of high fever at least 38 degrees and coughs. He visited the ASAN Medical Center in Seoul as an outpatient and was hospitalized in Pyeongtaek St. Mary’s Hospital. Then, on May 20, the person visited the ER at Seoul Samsung hospital and was confirmed as the first MERS case in the country to be transported to a national designated treatment bed. The wife of the first confirmed patient was also confirmed as the second MERS case. The patient who had used the same ward with the first patient was confirmed as the third MERS case. The healthcare authority isolated 64 people in close contact with the three confirmed patients, including their families and medical staff [3]. However, since then, MERS cases were also found in other wards. A patient missed out in the epidemiological investigation even took a business trip to China. In the meantime, patients moved around other hospitals to spread MERS.

It was found that MERS virus spread only within the institutions and sustained community infection was not identified. But, unlike the initial health authority’s expectation that there would be no quaternary infection, a total of 23 quaternary infection cases were found as MERS was protracted. These patients were found to have been infected in hospital wards and rooms, ERs, and in the process of MERS diagnosis and transportation. It is also known that 8 cases were found to have unknown infection process in the epidemiological investigation found [9].

**Table 2. No. of patients by MERS infection category (unit: person)**

	<b>Primary infection</b>	<b>Secondary infection</b>	<b>Tertiary infection</b>	<b>Quaternary infection</b>	<b>Unknown route</b>	<b>Total</b>
<b>No. of confirmed cases</b>	1	30	124	23	8	186

Source: KBS Digital News Bureau, MERS infection status. KBS. 2015

**3.2. Governmental response against MERS crisis**

After the first MERS case confirmation, the Ministry of Health and Welfare elevated the infectious disease warning alert into caution; installed the central preventive measures headquarters; and let the Head of Korea Centers for Disease Control and Prevention to generally manage MERS responses. However, unlike expectation, MERS continued to spread and the response structure was overhauled. The central anti-MERS headquarters was established. Strategies were set up to actively use private sector experts, review the epidemiological investigation processes, and flexibly apply responsive manual and relevant guidelines. The central anti-MERS HQs organized a immediate response team with infectious disease experts. The team instantly advised the necessary measures to prevent intra-hospital infection spread as the top priority. In addition, to reinforce epidemiologic investigation, private-sector supportive teams were formed in national, municipal and provincial governments. To support the central anti-MERS HQs at the pan-governmental dimension, pan-government anti-MERS support HQs consisting of 11 ministries and local governments was activated. The Minister for Public Safety and Security led the pan-government anti-MERS HQs with the participation of office for government policy coordination, health ministry, education

ministry, foreign ministry, defense ministry, government administration ministry, culture ministry, agriculture ministry, maritime ministry, police agency, etc.

#### **4. Limitations of public healthcare system unveiled in the MERS accident & improvement measures**

The prevention and management guidelines on Middle East Respiratory Syndrome (MERS) established in 2014 categorize people with infectious contact into close contact and other contact. In the initial infection period, close contact was applied as referring to infectious contact within 2 meters for 1 hour or over. But as the disease continued to spread, the definition was expanded in June 2015 to include the cases of staying within 2 meters from patient without wearing an appropriate personal protective device (gown, gloves, N95-grade facial mask, goggles or facial protective gear) or cases of staying in the same room, or doctor's room, treatment room, ward (family, medical staff, etc.); or cases of directly contacting a patient's respiratory secretions. As such, the definition of close contact was extended to hugely increase the numbers. Consequentially, during the peak of MERS, 6,729 suspected patients were isolated a day until test results, overloading the monitoring ability of community health centers. In addition, the essential problem of self-isolation emerged as the system relied upon suspected patients' voluntary cooperation, further confusing the already chaotic situation. During the MERS outbreak, the most important government function was to manage patients and people contacting the patients. Nevertheless, the government unilaterally changed and informed the guidelines without any preceding education for community health centers on people under self-isolation. Also, the governmental guidelines and details of self-isolation and its supportive measures were too confusing to prevent disease spreading in any effective way [3][9].

Meanwhile, there are 38 regional hub public hospitals in South Korea. For the purpose of local residents' health improvement, they provide quality medical services while functioning as a medical safety net by responding to infectious diseases, emergent situations, medical disasters, etc. In the initial MERS outbreak, patients were to be isolated and treated in the negative pressure isolation wards in municipal/provincial hospitals and national designated hospitalization ward (isolation). But as the number of patients increased, each region experienced lack of negative pressure isolation wards. Mainly the regional hub public hospitals had to experience confusion as they had received no previous education on how to use negative pressure ward or patients' room.

In the meantime, amid the rising number of people with infectious contact, isolation wards were added to medical institutions other than municipal/provincial hub hospitals. But, most of the patients were found in Seoul and Gyeonggi-do region, pushing the ward resources to the limit. After all, patients were transported to other regions with available rooms and, in this process, some local residents presented opposition to bring in patients from outside [9].

#### **5. Conclusions**

South Korea can learn some valuable lessons from the recent outbreak of MERS. MERS has taught that infectious disease control has the public nature and, for its prevention and treatment, close network is essential among the central government, local governments and institutions. Moreover, to protect local residents' right to health; primary and secondary public healthcare institutions are required to play a leading role.

The implications of the analysis are as follows. First, the emergency room system so only those who need emergency treatment are admitted should be fortified. Second,

regional hub public hospitals should be expanded to set up a public healthcare system. Community health centers, regional hub hospitals, and national university hospitals need to be connected to build up a public healthcare system and emergency medical system connection. Facility improvement needs to be supported to help improve the efficiency of public healthcare service.

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