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From Uncoordinated Patchworks to a Coordinated System: MERS-CoV to COVID-19 in Korea

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Abstract

South Korea has experienced two national public health crises during this decade. The 2015 Middle East respiratory syndrome-coronavirus (MERS-CoV) response's failure to address coordination problems or authority conflicts provided an opportunity to revise its national disease control system before the 2020 coronavirus disease 2019 (COVID-19) crisis. Our reflection on Korea's MERS-CoV and COVID-19 responses provides a perspective on public health emergency management. It is difficult to project the scale of an emerging infectious disease in advance because of its contagious nature and ability to cross geographic boundaries. In a national epidemic or global pandemic, a centralized coordination effort at the national level is desirable, rather than fragmented local, city, or regional efforts.

Keywords

public health emergency management, Incident Command System, MERS-CoV, COVID-19

Amid the trend of increasing confirmed cases of coronavirus disease 2019 (COVID-19) around the globe, South Korea has emerged as a model for other countries to emulate (Normile, 2020). The United States and South Korea confirmed their first COVID-19 cases on the same day, January 20, 2020 (Holshue et al., 2020; Shim et al., 2020; World Health Organization, 2020). Since March 2020, the confirmed cases increased slowly and steadily in Korea, but rapidly and exponentially in the United States. Furthermore, this slow increase in Korea has been achieved without locking down entire cities or taking any other authoritarian measures (Normile, 2020), whereas the U.S. government was unable to act during the valuable initial 2 months to prepare for the widespread outbreak (Wallach & Myers, 2020). In our view, the primary reason the United States became the epicenter of this pandemic in March 2020 is its lack of organized and centralized coordination at the national level to take the necessary early actions.

The global response to COVID-19 has revealed clearly that the United States is ill-prepared for the pandemic. The provision of testing kits throughout the country is patchy; professional clothing, masks, and other equipment are in serious shortage, and the enforcement of state and local containment policies is not as rapid or strict as in other countries. Both the lack of coordinated actions and delayed actions during the initial period of the COVID-19 outbreak have been accompanied by unexpected issues, such as state and local governments acting alone, which has led them to compete for critical supplies (e.g., "Competition Among State. . . ," 2020). Historically, the Federal Emergency Management Agency (FEMA) has been committed to reducing coordination conflicts in response to all types of emergencies by developing the National Incident Management System (NIMS).

Since the attacks on the World Trade Center and the Pentagon on September 11, 2001, the U.S. Department of Homeland Security (DHS) has mandated that organizations involved in emergency operations at the local, state, and federal level in the United States adopt the NIMS, which is scalable and flexible, in the sense that it is able to address small, routine incidents as effectively as large, complex, and multijurisdictional incidents (McGuire & Silvia, 2010). The NIMS is also designed to help all levels of government, nongovernmental organizations, private sector, and non-profit sector work together during an emergency management cycle, including a response (FEMA, 2017). The NIMS' essential component, as well as its coordinating structure, is the Incident Command System (ICS; FEMA, 2017). The ICS is a structural innovation that has shown strength in coordinating multiple response organizations in a network; "The ICS is, therefore, not a pure hierarchy but an effort to coordinate a network via a hierarchical form of governance" (Moynihan, 2008, p. 208).

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The NIMS/ICS' role and effect have been examined rarely as they relate to a public health crisis. Although ICS had some successful applications at local governments during public health crisis (c.f., Adams et al., 2010), many state or local health departments did not use the ICS readily or widely until the aftermath of the 2009 H1N1 outbreak (Papagiotas et al., 2012). Since that crisis, there have been several other public health crises, but they did not even approach the scale of COVID-19 in 2020. The nature and scale of the disasters in which the ICS has been tested in the past are not comparable to those in the current pandemic. The rapid community transmission and the exponential growth in confirmed cases in a public health crisis require a timely and coordinated response on a large scale. However, it has not been visibly apparent which structure guides the countrywide response in the United States during COVID-19.

South Korea has experienced two national public health crises during this decade: Middle East respiratory syndrome coronavirus (MERS-CoV; MERS) in 2015 and COVID-19 in 2020. This perspective article elaborates on the planning and organizational changes the Korean government made between the two public health crises. We then discuss what insights these experiences offer to the U.S. NIMS to help achieve better coordination during public health crises.

South Korea's Response Systems to Recent Coronavirus Outbreaks

The MERS-CoV experience in 2015, which was recognized largely as a failed response, has informed Korea's response to COVID-19 (Normile, 2020). The failure to control the MERS-CoV's spread was attributable primarily to the government's inadequate and ineffective response, such as the failure to establish effective collaboration systems, lack of communication, and secrecy in critical information release (K. Kim et al., 2017; Ministry of Health and Welfare [MOHW], 2016). The significant lesson the Korean government learned from MERS-CoV that may be applied to COVID-19 is to use centralized coordination power while giving sufficient responsibility to the health authority to act as early, rapidly, and transparently as possible.

Before MERS-CoV

The MOHW in Korea oversees the Korea Centers for Disease Control and Prevention (KCDC) and is responsible for responding to infectious diseases. From a national planning perspective, the Infectious Disease Crisis Management Standard Manual that the MOHW (2014) prepared defines the infectious disease crisis management system. This system addresses the way that the two health authorities (the MOHW and KCDC) must coordinate with other government agencies and organizations in response to an infectious disease outbreak (Y. Kim, Ku, & Oh, 2019). According to the Standard Manual, different central government agencies can establish crisis response headquarters within their organizations (that serve as an ICS), depending upon the crisis levels: Blue indicates disease cases abroad with no immediate threat of import to the country; Yellow, the domestic import of the disease from abroad; Orange, the confined spread of the disease within the country; and Red, the spread of the disease in communities throughout the country (Y. Kim et al., 2020).

For example, Figure 1 shows that, if necessary, a headquarters is established within the Ministry of Public Safety and Security (MPSS; disestablished in 2017) at the Red level. The Manual also states that different headquarters, which do not appear in Figure 1, are established within the KCDC at the Yellow *or* Orange levels or within the MOHW at the Red level. In addition, the disease's geographic spread may require multiple commands in different locations, in which incident commanders report to a single area commander (Moynihan, 2008). Figure 1 shows that local commands (i.e., Local Disaster and Safety Countermeasure Headquarters) are established *within* local governments. If necessary, the KCDC, as well as the MPSS, can direct the local commands, while Korea's Ministry of the Interior (MOI) supervises and oversees local and provincial governments.

During MERS-CoV

The scale of the 2015 MERS-CoV crisis was unprecedentedly large for Korea, and it made noticeable policy and organizational decisions during the crisis. The crisis was responded to officially at the Yellow level. At that level, the KCDC's Central Quarantine Headquarters is intended to be the ICS (MOHW, 2014). The headquarters was established on May 20, 2015, but was soon replaced by the Center for MERS Management Headquarters (CMMH) on May 28, 2015. After June 2, 2015, the MOHW director led the CMMH as the incident commander. The CMMH was not the planned headquarters within the MOHW defined in Figure 1, but was the result of the Korean government's decision to respond to the crisis unofficially at the Orange or Red level.

The CMMH was composed of approximately 190 personnel from the MOHW, the KCDC, and other organizations, such as Seoul Metropolitan City, and included 14 teams in four divisions: planning, field investigation, resource management (quarantine), and public relations (MOHW, 2016, p. 58). The CMMH's organizational structure was a typical ICS structure—a highly centralized modular structure (c.f., Cruz et al., 2015; Moynihan, 2008). The CMMH divisions and functions differed somewhat from those of the Central Disaster Management Headquarters in the Standard Manual. The CMMH enhanced the capacity to manage crisis scenes with epidemiological investigation and laboratory testing, as well as manage human resources and facilities (MOHW, 2016). The CMMH appeared to combine the functions of the Central Disaster Management Headquarters (the planned headquarters in the MOHW) and the Central Quarantine Headquarters (the planned headquarters in the KCDC) in the Standard Manual.

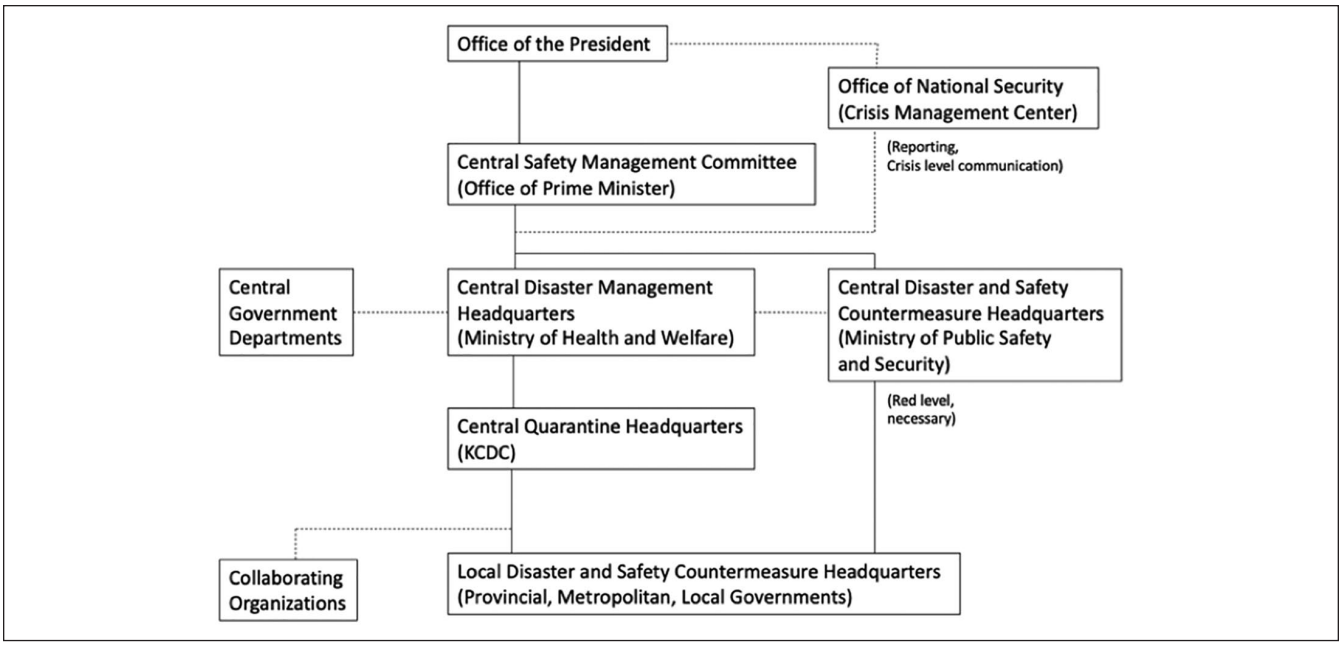

Figure 1. The infectious disease crisis management system (2014).
Source. The Ministry of Health and Welfare (2014, p. 13).
Note. Solid vertical lines indicate the chain of command and coordination; dotted horizontal lines indicate suggested collaborative relations. KCDC = Korea Centers for Disease Control and Prevention.

Both benefits and costs accompanied this decision to maintain the crisis level at Yellow and create an ad hoc ICS that was not defined in the national guidelines. The CMMH played a significant role during the crisis, and bore a significant coordination burden at the center of the MERS response network (Kim, Kim et al., 2019). However, the CMMH was unable to address the collaboration and coordination problems, communication breakdowns, and conflicts among government agencies sufficiently or effectively. Together with the CMMH, the MOHW and KCDC were also involved in the response throughout the crisis (Y. Kim et al., 2020). This could have confused other response organizations with respect to understanding the ICS at the national level. Organizations' varying levels of understanding of an ICS can pose barriers to coordinated action, and therefore, the ICS may not function as expected (Moynihan, 2009).

Post-MERS-CoV

The Standard Manual was revised in February 2019, and several noticeable revisions were made (MOHW, 2019). First, the Manual stated relatively clearly at which agency level the ICS must be established according to which crisis level (see Figure 2). During Blue or Yellow, the KCDC establishes the Central Epidemic Control Headquarters and those in charge of relevant departments and ministries are dispatched to the Emergency Operations Center (EOC) (KCDC, n.d.). The EOC conducts various activities to control and terminate the crisis situation rapidly, such as securing and distributing manpower and material resources, conducting epidemiological investigation, and cooperating with local governments and related organizations (KCDC, n.d.). Second, the Manual enhanced the role of the Central Disaster and Safety Countermeasures Headquarters (CDSCHQ) that oversees the health authorities (MOHW and KCDC) as well as the national response overall during the most serious crisis level (Red). The Prime Minister or the Minister of the Ministry of the Interior and Safety (MOIS; the MOI during the MERS-CoV) is responsible for directing the CDSCHQ depending on the crisis' severity. Third, it also distinguished the local commands from the local governments and specified the collaborative relations among them. However, the local commands report to the area's mayor or governor, which can facilitate coordination and collaboration between the local commands and local governments. Figure 2 shows that both the local commands and governments are required to vertically coordinate with the MOHW and KCDC. When the event progresses to a national crisis, the CDSCHQ also directs the local commands.

During COVID-19

On January 8, 2020, the Korean government increased the crisis level to Blue because a suspected case that had visited Wuhan in China showed symptoms and was under laboratory testing for confirmation. This triggered stricter immigration screening and local surveillance. On January 20, 2020, the crisis level was elevated to Yellow as the suspected

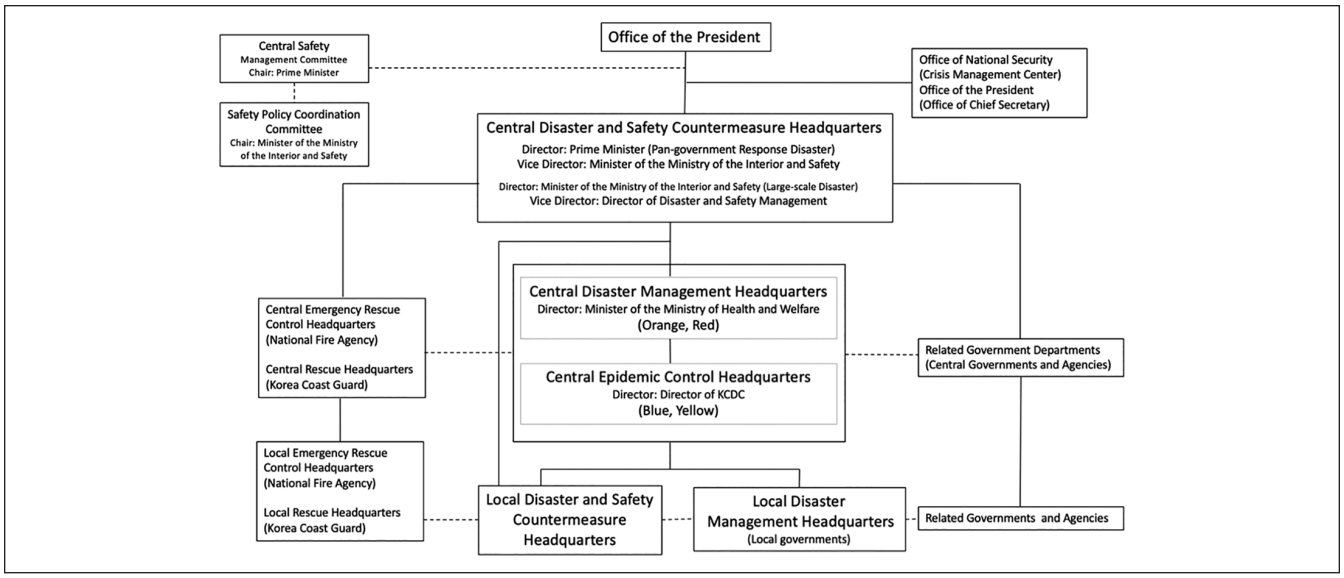

Figure 2. The infectious disease crisis management system (2019).
Source. The Ministry of Health and Welfare (2019, p. 10).
Note. Solid vertical lines indicate the chain of command and coordination; dotted horizontal lines indicate suggested collaborative relations. KCDC = Korea Centers for Disease Control and Prevention.

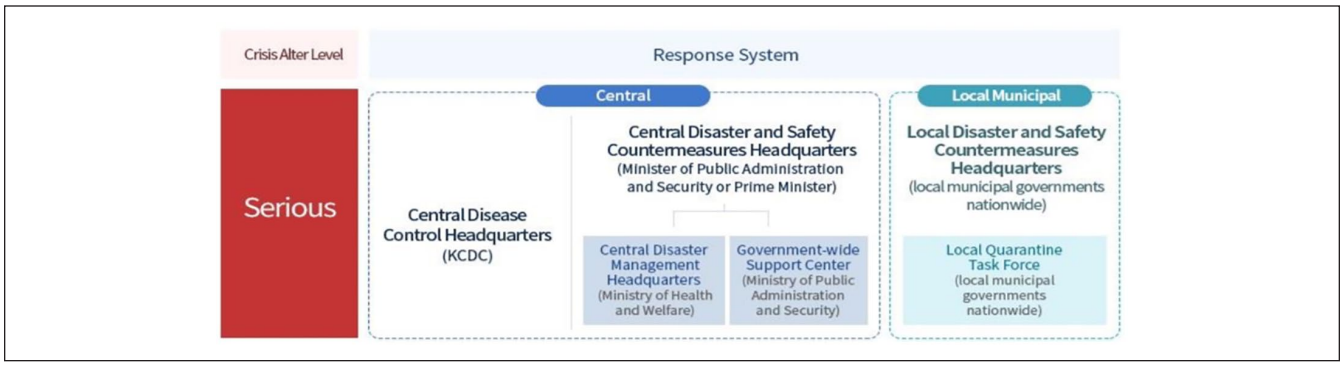

Figure 3. The Korean government's response system since February 2020.
Source. The Government of the Republic of Korea (2020, p. 8).
Note. KCDC = Korea Centers for Disease Control and Prevention.

case was confirmed to have COVID-19, and the KCDC established the Central Epidemic Control Headquarters on the same day. Within a week, the crisis level was elevated again to Orange because four further cases were confirmed to have COVID-19, and the MOHW established the Central Disaster Management Headquarters on January 27, 2020. On February 23, 2020, the Korean government announced the crisis had increased to the Red level because of community transmission. The CDSCHQ was established on the same day, and the Prime Minister was appointed as its director. This ICS has managed the COVID-19 crisis in Korea to date. See Figure 3 for Korea's present response system.

The KCDC has become the central disease control headquarters within the CDSCHQ, and leads the response with assistance from the Minister of Health and Welfare who serves as the CDSCHQ's first deputy head. The MOIS has assumed the role of the second deputy head and provides necessary assistance, including coordination between the central and local governments. Local governments have also formed the CDSCHQ's Local Disaster and Safety Countermeasures Headquarters (i.e., the local commands) to establish hospital sites dedicated to the disease and procure sickbeds (The Government of the Republic of Korea, 2020). The central government provides assistance to procure sickbeds, manpower, and supplies, and in other areas where local governments face shortages. As of April 2020, there has been no report of significant collaboration and coordination problems, communication breakdowns, or information-sharing problems among agencies in the governments or organizations across sectors under the CDSCHQ's leadership.

The NIMS/ICS and Public Health Crisis in the United States

In May 2018, President Trump closed the White House pandemic office that President Obama established, which was designed to prepare for the next disease outbreak after the 2014 Ebola epidemic. Instead, Trump reassigned certain pandemic response roles to the National Security Council ("Partly False Claim: . . .," 2020). The National Security Council, which coordinates multiple federal organizations' policies, is not an ICS because an ICS is intended to manage tensions and coordination difficulties on the part of the response network, which includes intergovernmental and nonpublic actors and deals as well with specific issues of operational tactics (Moynihan, 2008). On January 29, 2020, the White House formed a task force to coordinate and oversee the Administration's efforts to monitor, prevent, mitigate, and contain the spread of COVID-19 (The White House, 2020). The Secretary of Health and Human Services leads the task force, which consists of representatives from 12 federal departments or organizations. It remains unclear how the task force is able to oversee the countrywide response in the United States during this event.

The need for multifaceted strategies that cover multiple aspects of the disease response simultaneously may be the very reason to adopt the NIMS/ICS for coordination and communication among organizations (Jensen & Thompson, 2016). However, integrating the ICS principles (i.e., central and single command) and traditional public health response functions (i.e., epidemiology, surveillance, laboratory testing, close contact control, and health communications) is known to be a challenging task (Papagiotas et al., 2012). Public health professionals make decisions based on consensus, consultation, and experienced considerations (Bone, 2006). Many factors need to be negotiated and given equal attention, which somehow contradicts the bureaucratic logic embedded in the ICS. The lesson the CDC learned from the 2003 SARS to the 2009 H1N1 was to ". . . allow public health to use NIMS/ICS to benefit the response instead of trying to adapt the public health response to NIMS/ICS" (Papagiotas et al., 2012, p. 273). This is an interesting lesson on which to reflect in the COVID-19 context. Korea's experiences during recent coronavirus outbreaks suggest that the response to a pandemic may be insufficient even when public health is allowed to use NIMS/ICS. Below we provide several perspectives on the NIMS' critical component (i.e., ICS), with the hope that it can induce proper, concerted actions and efforts in the country on the part of all the government systems and beyond during this public health crisis.

It is critical to decide at which crisis level and in which government agency the ICS must be established. The ICS is not a universally applicable bureaucratic organization, but rather a modular coordination mechanism designed to impose order on specific dimensions of chaotic, interorganizational response environments during disasters (Buck et al., 2006). In Korea's national plan, the decision to establish the ICS is associated closely with the assessment of the evolving disease situation. As the disease's dynamic changes, the response system must be able to adapt and evolve accordingly. However, two potential challenges were identified in the MERS-CoV response experience. First, assessing the emerging virus accurately is challenging. Second, whether the government can perform as described in the plan, particularly in a dynamically evolving situation, is debatable. Korea learned a difficult lesson from the MERS-CoV response with respect to this organizational decision, which was not synchronized with the crisis level. The revised Standard Manual (MOHW, 2019) articulates better at which crisis level an ICS must be established and under whose command. With COVID-19, it is also evident that the ability to adopt ICSs at the different crisis levels without confusion and conflicts has improved significantly. The experience from the past and the revised national guidelines enhanced this critical capacity in the response system. This emphasizes the importance of a national plan that articulates clearly the crisis levels and the organizational response, as well as the government's ability to implement the plan. In such a condition, the ICS in action can exercise appropriate power and discretion as the commander, and other responding organizations are not confused about who is in command in the crisis.

With the ICS, either a single incident commander or a unified command is designated to manage the emergency, depending on the disaster's boundaries and the response needs (FEMA, 2017). For example, during a regional health epidemic, a state health department may be sufficient to serve as a single incident commander to coordinate multiagency response efforts at many local areas within the disaster region (Kirrage et al., 2007; Quinn et al., 2018). As a crisis expands to a larger scale, the demand for a more competent incident commander or even a unified command will also increase. In Korea, the incident commander is preplanned in the national plan and designated as the minister(s) of a specific department. One of the innovative actions Korea adopted after the first crisis was the transition from a single commander or committee to a unified command that can manage the response activities jointly when the disease becomes a national crisis. During the MERS-CoV response, the Korean government learned that both quarantines and administrative and financial support are equally critical. These functions are separated in different government agencies (quarantines in the MOHW and administration in the MOIS). Rather than using a single incident commander or suggesting potential collaboration as a committee vaguely (Figure 1), creating an ICS that combines and coordinates both functions as a unified command was a critical change the Korean government made in the plan (Figure 2), as well as its implementation during the COVID-19 crisis (Figure 3). The literature has suggested that it is difficult to integrate public health and emergency response functions via the NIMS/ICS (Papagiotas et al., 2012), but the interaction between crisis factors and management factors is critical to

the ICS' success (Moynihan, 2008). Thus, both for a national epidemic and global pandemic, establishing a unified command that can encompass and control critical crisis and support functions can be an effective approach to address the integration challenge.

A public health crisis requires not only field investigation and management of health departments, but it is necessary to consider other issues, such as other organizations' roles and responsibilities, the political landscape, and communication with the public (Kirrage et al., 2007). A more effective integration of services in the health system and across other functions can enhance the ability to absorb and adapt to shock (Legido-Quigley et al., 2020). It not only absorbed shock better; this decision to integrate the commanders of critical functions in the ICS reduced friction among different government jurisdictions and sectors significantly compared with the 2015 MERS-CoV outbreak. The well-crafted system has also reduced conflicts over critical issues, such as risk information release, which was one of the major criticisms of the MERS-CoV response. While the COVID-19 response is still in process and not without flaws, the response system's function overall appears to flow smoothly. The collaboration, coordination, and communication problems between central government agencies, between the central government and local governments, or even between the public and private sectors, have improved significantly.

In this perspective essay, we focused primarily on the national infectious disease response system and ICS because of the scale of the two infectious disease outbreaks in Korea. It is certainly a worthy endeavor to examine coordination and collaboration between ICSs across government levels or across geographic areas closely. Korea's government may already be in a condition in which the ICS could function well, given its highly centralized unitary system of government. However, this does not imply that there are no conflicts in the response coordination or authority among different governments or organizations across sectors, as we witnessed during the MERS-CoV response (MOHW, 2016). The interpretation of the national plan and jurisdictional rules is not always straightforward among different actors, particularly during the crisis. In Korea, local and provincial governments can challenge the central government's decisions through jurisdictional dispute, and the challenge of "articulation" for coordination in an emergency response still remains (c.f., Brooks et al., 2012). Finally, Korea is a small country with respect to its total land area. This context can influence the efficiency of resource mobilization and communication within different parts of the country. Thus, our insights must be tempered with a cautious understanding of the context.

Conclusion

During the COVID-19 pandemic crisis, the disease's epicenter has shifted over several countries. At one point, it was China, Korea, and Italy. However, since late March 2020, the United States, as well as several European countries, such as Spain, became the new epicenter. This evolving situation in the pandemic and the lessons Korea learned from its outbreaks suggest that it is necessary to invest the effort to establish an effective ICS at the local or regional level because it deals with the crisis scenes at the frontline; however, it is insufficient to deal with a national epidemic or pandemic crisis effectively. COVID-19 offers an opportunity to rethink the NIMS in a public health crisis and a global pandemic. Furthermore, a pandemic differs from a large-scale domestic epidemic. A pandemic does not negate the importance of effective national, regional, and local ICSs within a country, but it calls for such a structure in other countries, as well as coordination among the countries to be truly effective during a global pandemic such as this.

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