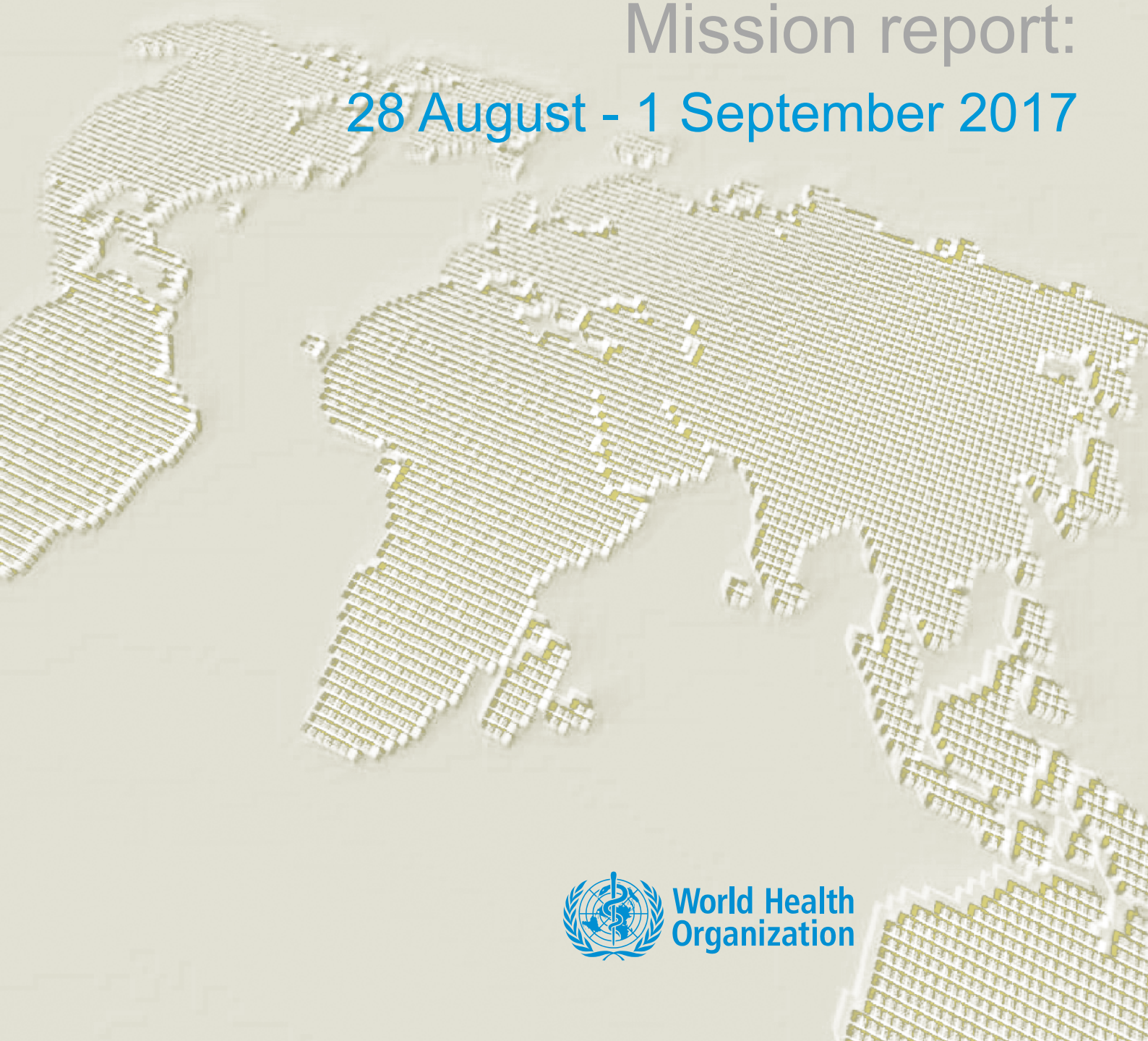
JOINT EXTERNAL EVALUATION OF IHR CORE CAPACITIES

of the

REPUBLIC OF KOREA

Mission report:

28 August - 1 September 2017



World Health Organization

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WHO/WHE/CPI/2017.65

Suggested citation. Joint external evaluation of IHR core capacities of the Republic of Korea: Geneva: World Health Organization; 2017 (WHO/WHE/CPI/2017.65). Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

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Layout by Genève Design

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ACKNOWLEDGEMENTS

The Joint External Evaluation (JEE) Secretariat of the World Health Organization (WHO) would like to acknowledge the following, whose support and commitment to the principles of the International Health Regulations (2005) have ensured a successful outcome to this JEE mission.

- The Government and national experts of the Republic of Korea for their support of, and work in, preparing for the JEE mission.
- The Governments of Australia, Canada, China, Finland, Japan, Singapore, the United Kingdom and the United States of America for providing technical experts for the peer review process.
- The Food and Agriculture Organization of the United Nations (FAO) for its contribution of experts and expertise.
- The Governments of Finland and Germany for their financial support to this mission.
- The following WHO entities: Health Emergencies Programme of the Western Pacific Regional Office and the Department of Infectious Hazards Management at WHO headquarters.
- Global Health Security Agenda Initiative for its collaboration and support.

Abbreviations

AMR	antimicrobial resistance
APQA	Animal and Plant Quarantine Agency
APSED	Asia Pacific Strategy for Emerging Diseases
BL	biosafety level
EBS	event-based surveillance
EIO	Epidemic Intelligence Officers
EOC	emergency operations center
EQA	external quality assurance
FAO	Food and Agriculture Organization of the United Nations
FETP	Field Epidemiology Training Program
FMTP	Field Management Training Program
GHSA	Global Health Security Agenda
GOARN	Global Outbreak Alert and Response Network
HCAI	healthcare-associated infection
HRP	high-risk pathogens
IBS	indicator-based surveillance
IHR	International Health Regulations
IHR NFP	National IHR Focal Point
IMS	Incident Management System
INFOSAN	International Food Safety Authorities Network
IRIS	Immunization Registry Information System
JEE	joint external evaluation
KCDC	Korea Centers for Disease Control and Prevention
KDRT	Korean Disaster Relief Team
KINS	Korea Institute of Nuclear Safety
LMO	living modified organisms
MAFRA	Ministry of Agriculture, Food and Rural Affairs
MERS	Middle East Respiratory Syndrome
MFDS	Ministry of Food and Drug Safety
MoE	Ministry of Environment
MOHW	Ministry of Health and Welfare

MoIS	Ministry of the Interior and Safety
MoND	Ministry of National Defence
MOU	memorandum of understanding
NIER	National Institute of Environmental Research
NSSC	Nuclear Safety and Security Commission
OIE	World Organisation for Animal Health
PHEIC	public health emergency of international concern
PoE	points of entry
PPE	personal protective equipment
RIHE	Research Institutes of Health and Environment
ROK	Republic of Korea
RRT	rapid response team
SOP	standard operating procedure
WHO	World Health Organization

Executive summary

Background

The International Health Regulations (IHR (2005)) are the legal framework for global health security. All Member States are required to develop minimum core capacities to detect, assess, report and respond to acute public health events and emergencies. In the Western Pacific Region, the Asia Pacific Strategy for Emerging Diseases (APSED) has been developed as a common regional framework for action to guide the Member States to implement the IHR (2005) since 2005. More recently, APSED has been updated to include public health emergencies (Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies [APSED III]) and has been endorsed by the Regional Committee Meeting (RCM).

The Republic of Korea is fully committed to meeting the IHR (2005) requirements for health security. The country is the fifth Member State in the WHO Western Pacific Region to participate in the voluntary joint external evaluation (JEE), and the first developed country in the region to undergo this process. APSED III is becoming more relevant even for developed countries such as the Republic of Korea, especially following the Middle East Respiratory Syndrome (MERS) outbreak in 2015. Many international and regional initiatives have emerged in recent years to further support the implementation of the IHR (2005) for global health security. These initiatives include the Global Health Security Agenda (GHSA) launched in 2014, of which the Republic of Korea is the current chair of the steering group for 2017.

The IHR JEE is one of the core components of the IHR monitoring and evaluation framework, moving from exclusive self-evaluation to joint internal and external evaluation to assess IHR capacities. A JEE provides a unique opportunity for national and international collaboration and multisectoral teamwork within the country. In the Republic of Korea, the JEE process started with a self-evaluation overseen by the Korea Centers for Disease Control and Prevention (KCDC) JEE Taskforce which was established by the Ministry of Health and Welfare in March 2017. Over a 6-month period, the JEE Taskforce worked collaboratively to compile all the information and supporting documents required by the JEE tool to prepare a comprehensive self-assessment report. This was a substantial multisectoral effort bringing together ten core ministries through three working-level review meetings, two workshops, as well as numerous consultations with additional ministries.

From 28 August to 1 September 2017, the JEE mission took place in the Republic of Korea, where a multisectoral team of international and national experts jointly conducted a review of the Republic of Korea's IHR core capacities in the 19 technical areas using the JEE tool. This report is the product of the JEE in the Republic of Korea and summarizes the evaluation findings and recommended priority actions for the 19 technical areas in the JEE tool.

Findings from the joint external evaluation

The JEE team was highly impressed by the Republic of Korea's outstanding effort to prepare for the JEE. It is evident that the Republic of Korea put in considerable time, energy and thought to the preparation of a high-quality self-assessment report, presentations of the technical areas, and the well-planned site visits to demonstrate system functioning. The JEE team unanimously agreed that the Republic of Korea has highly sophisticated systems and capacities in place to address emerging and re-emerging infectious disease threats and public health emergencies. Across the different technical areas, the JEE team noted the Republic of Korea's significant achievements in establishing a comprehensive set of legislation, cultivating a strong culture of conducting exercises, and applying innovative technologies to public health.

The JEE team assessed the Republic of Korea's IHR core capacities using the JEE tool, and categorized the majority of the indicators as having sustainable capacity (60.4%) and demonstrated capacity (31.3%), with 8.3% categorized as having developed capacity. Although the Republic of Korea has achieved high scores, the JEE team cautions on the danger of becoming complacent, as this level of capacity can only be sustained with continued multisectoral effort and stable investment in the core public health functions supporting health security before and after events occur.

The MERS outbreak was a major event in the Republic of Korea, and trigger that resulted in 48 reforms to enhance the country's ability to prevent, detect, and respond to emerging infectious disease threats and public health emergencies. The JEE team wishes to commend the Republic of Korea for translating their lessons learned from this event into concrete actions. Dedicated divisions in KCDC have been established to strengthen event-based surveillance, information collection, risk assessment and emergency operations through the public health Emergency Operations Center (EOC). During the review, the JEE team noted several strong technical areas with potential for high public health impact. These included well-established systems to maintain high levels of immunization coverage in the population; the use of robust systems to monitor and control outbreaks related to food safety; an impressive national laboratory system equipped with the capability to test a wide range of pathogens from human, food and environmental samples; and dedicated teams for surveillance, risk assessment, and antimicrobial resistance (AMR) mitigation.

The MERS outbreak was also a reminder that even the most sophisticated system can be challenged by public health threats. On this note, the JEE team recognized that even the best systems can still have areas for improvement. One cross-cutting theme the JEE team noted is the need to further strengthen multisectoral coordination during all public health emergencies. The Republic of Korea may wish to consider testing the operational linkage among different sectors for all public health emergency responses to ensure that the expected level of coordination can be realized in practice.

Specific areas with opportunities for improvement include prioritizing public health risks and resource mapping, establishing a system for sending and receiving health personnel during a public health emergency, and risk communication, especially related to internal and partner coordination and communication engagement with affected communities.

However, even in technical areas where the Republic of Korea has achieved developed or sustainable capacities, there are still possibilities for further improvement. One such area to be emphasized is the importance of the continual strengthening of the National IHR Focal Point (IHR NFP) function and the IHR coordination capacity with other sectors including animal health and environment. Also, although the state-of-the-art point of entry quarantine programme highly impressed the JEE team, the Republic of Korea may wish to consider a paradigm shift for managing public health threats in our highly connected world where international travel time is now often shorter than the incubation period of many pathogens. Despite the high capacity of the workforce in the country, it is important to continue investing in the development and strengthening of a multi-disciplinary workforce under an all hazards, One Health approach, especially at the sub-national level. In addition, given the borderless nature of health security, the Republic of Korea may wish to explore having systems in place for regional and international collaboration and sharing of medical countermeasures and health professionals in the event of a large public health emergency.

Conclusions

Health security threats are increasing and becoming more complex to manage. Although the Republic of Korea has made considerable progress, it is important to note that in our interconnected world, vulnerability is universal. No single country or single agency can manage all the health security threats alone.

The Republic of Korea demonstrated a high level of capacity in this JEE. It is important to note that having sustainable capacity across many technical areas also means there is an obligation to proactively support the other Member States in the region to maintain and strengthen their core capacities under IHR (2005). Moving forward, the JEE team looks forward to seeing the Republic of Korea play a leadership role at the regional and global level. The JEE team encourages the Republic of Korea to continue its commitment to advocate and invest resources to enhance global health security, both domestically and in developing countries in the region and globally.

In closing, the JEE team wishes to extend their deepest gratitude to the Republic of Korea for their thorough preparation, active participation, and open discussion to share their depth and breadth of experiences during this evaluation process.

Republic of Korea scores

Technical areas	Indicators	Score
National legislation, policy and financing	P.1.1 Legislation, laws, regulations, administrative requirements, policies or other government instruments in place are sufficient for implementation of IHR (2005)	5
	P.1.2 The State can demonstrate that it has adjusted and aligned its domestic legislation, policies and administrative arrangements to enable compliance with IHR (2005)	5
IHR coordination, communication and advocacy	P.2.1 A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR	5
Antimicrobial resistance	P.3.1 Antimicrobial resistance detection	5
	P.3.2 Surveillance of infections caused by antimicrobial-resistant pathogens	5
	P.3.3 Health care-associated infection (HCAI) prevention and control programmes	5
	P.3.4 Antimicrobial stewardship activities	4
Zoonotic diseases	P.4.1 Surveillance systems in place for priority zoonotic diseases/pathogens	4
	P.4.2 Veterinary or animal health workforce	4
	P.4.3 Mechanisms for responding to infectious and potential zoonotic diseases are established and functional	4
Food safety	P.5.1 Mechanisms for multisectoral collaboration are established to ensure rapid response to food safety emergencies and outbreaks of foodborne diseases	5
Biosafety and biosecurity	P.6.1 Whole-of-government biosafety and biosecurity system is in place for human, animal and agriculture facilities	5
	P.6.2 Biosafety and biosecurity training and practices	4
Immunization	P.7.1 Vaccine coverage (measles) as part of national programme	5
	P.7.2 National vaccine access and delivery	5
National laboratory system	D.1.1 Laboratory testing for detection of priority diseases	5
	D.1.2 Specimen referral and transport system	5
	D.1.3 Effective modern point-of-care and laboratory-based diagnostics	5
	D.1.4 Laboratory quality system	4
Real-time surveillance	D.2.1 Indicator- and event-based surveillance systems	5
	D.2.2 Interoperable, interconnected, electronic real-time reporting system	5
	D.2.3 Integration and analysis of surveillance data	5
	D.2.4 Syndromic surveillance systems	4
Reporting	D.3.1 System for efficient reporting to FAO, OIE and WHO	5
	D.3.2 Reporting network and protocols in country	5
Workforce development	D.4.1 Human resources available to implement IHR core capacity requirements	5
	D.4.2 FETP[1] or other applied epidemiology training programme in place	5
	D.4.3 Workforce strategy	4

1 FETP: Field epidemiology training programme

Technical areas	Indicators	Score
Preparedness	R.1.1 National multi-hazard public health emergency preparedness and response plan is developed and implemented	5
	R.1.2 Priority public health risks and resources are mapped and utilized	3
Emergency response operations	R.2.1 Capacity to activate emergency operations	5
	R.2.2 EOC operating procedures and plans	4
	R.2.3 Emergency operations programme	5
	R.2.4 Case management procedures implemented for IHR relevant hazards.	4
Linking public health and security authorities	R.3.1 Public health and security authorities (e.g. law enforcement, border control, customs) are linked during a suspect or confirmed biological event	5
Medical countermeasures and personnel deployment	R.4.1 System in place for sending and receiving medical countermeasures during a public health emergency	4
	R.4.2 System in place for sending and receiving health personnel during a public health emergency	3
Risk communication	R.5.1 Risk communication systems (plans, mechanisms, etc.)	4
	R.5.2 Internal and partner communication and coordination	3
	R.5.3 Public communication	4
	R.5.4 Communication engagement with affected communities	3
	R.5.5 Dynamic listening and rumour management	4
Points of entry	PoE.1 Routine capacities established at points of entry	5
	PoE.2 Effective public health response at points of entry	5
Chemical events	CE.1 Mechanisms established and functioning for detecting and responding to chemical events or emergencies	4
	CE.2 Enabling environment in place for management of chemical events	5
Radiation emergencies	RE.1 Mechanisms established and functioning for detecting and responding to radiological and nuclear emergencies	5
	RE.2 Enabling environment in place for management of radiation emergencies	5

Scores: 1=No capacity; 2=Limited capacity; 3=Developed capacity; 4=Demonstrated capacity; 5=Sustainable capacity.

PREVENT

National legislation, policy and financing

Introduction

The International Health Regulations (IHR) (2005) provide obligations and rights for States Parties. In some States Parties, implementation of the IHR (2005) may require new or modified legislation. Even if a new or revised legislation may not be specifically required, states may still choose to revise some regulations or other instruments in order to facilitate IHR implementation and maintenance in a more effective manner. Implementing legislation could serve to institutionalize and strengthen the role of IHR (2005) and operations within the State Party. It can also facilitate coordination among the different entities involved in their implementation. See detailed guidance on IHR (2005) implementation in national legislation at http://www.who.int/ihr/legal_issues/legislation/en/index.html. In addition, policies that identify national structures and responsibilities as well as the allocation of adequate financial resources are also important.

Target

Adequate legal framework for States Parties to support and enable the implementation of all their obligations, and rights to comply with and implement the IHR (2005). New or modified legislation in some States Parties for implementation of the IHR (2005). Where new or revised legislation may not be specifically required under the State Party's legal system, States may revise some legislation, regulations or other instruments in order to facilitate their implementation and maintenance in a more efficient, effective or beneficial manner. States Parties ensure provision of adequate funding for IHR implementation through the national budget or other mechanism.

Republic of Korea level of capabilities

The Republic of Korea (ROK) has a comprehensive legal framework to enable the implementation of the IHR (2005). For infectious diseases, the Ministry of Health and Welfare (MOHW) and the Korea Centers for Disease Control and Prevention (KCDC) operate under the Infectious Disease Control and Prevention Act and the Quarantine Act. Ministries from other sectors are also able to conduct their activities in line with the IHR (2005) all hazards approach under various legislation such as the Nuclear Safety Act, Chemicals Control Act, and the Act on the Prevention of Contagious Animal Diseases. The Framework Act on the Management of Disasters further describes the roles of various ministries and agencies during different kinds of public health events. The process for multisectoral coordination of the various laws is also in place.

The ROK regularly reviews and revises relevant laws to align with requirements under the IHR (2005) and after major public health events. This includes a major review of the relevant laws in 2006 after IHR (2005) were adopted by the 58th World Health Assembly in 2005, as well as after the Middle East Respiratory Syndrome (MERS) outbreak in 2015 where lessons learned were incorporated into existing legislation. The ROK has also incorporated the strengthening of IHR core capacities under the National Health Plan.

Finally, the ROK has allocated regular annual budgets as well as reserve funds and supplementary budget to enable relevant ministries, agencies, and local governments to prepare, detect, and respond to public health threats and emergencies.

Recommendations for priority actions

- Ensure all hazards are covered under the core capacity strengthening in the National Health Plan, in accordance with IHR (2005).
- Consider reviewing which actions taken during public health emergencies could be implemented as policies instead of being enacted as legislation to enable rapid implementation of necessary actions during an emergency.

Indicators and scores

P.1.1 Legislation, laws, regulations, administrative requirements, policies or other government instruments in place are sufficient for implementation of IHR (2005) – Score 5

Strengths/ best practices

- The ROK has comprehensive laws, policies, plans, and manuals to prevent, detect, and respond to infectious disease threats in humans and animals as well as other public health emergencies.
- A National Plan for Infectious Disease Control and Prevention has been established in 2013 and is to be revised every five years.
- The ROK has signed various memoranda of understanding (MOUs) to strengthen health security, such as the MOU signed in 2013 with China and Japan for a joint action plan and response to infectious disease outbreaks and public health emergencies. The ROK has also signed an MOU with WPRO to further strengthen human resource capacity especially in the area of field epidemiology training.
- In addition to regular budgets, the government is able to allocate reserve funds and supplementary budgets during emergencies, as in the case of the MERS outbreak in 2015.

Areas that need strengthening/ challenges

- Legal and systematic support is required to enhance human resource and expertise at the provincial level to better prepare, detect, and respond to infectious disease threats and public health emergencies.

P.1.2 The State can demonstrate that it has adjusted and aligned its domestic legislation, policies and administrative arrangements to enable compliance with the IHR (2005) – Score 5

Strengths/ best practices

- To ensure compliance with the IHR (2005), the ROK government has studied existing Acts and regulations to identify gaps and followed up with amendments to the laws. These include the Infectious Disease Control and Prevention Act and the Quarantine Act established in 1954, which have both been continually reviewed and revised to ensure that they are aligned with the ROK's obligations under the IHR (2005).
- Following major infectious disease outbreaks or public health events such as the MERS outbreak in 2015, the ROK has taken steps to revise existing legislation to further strengthen the preparedness, detection, and response to future infectious disease threats and public health emergencies.
- A process is in place to ensure that the various laws and regulations used by the different ministries and agencies are coordinated.

Areas that need strengthening/ challenges

- The role of the National IHR Focal Point (IHR NFP) needs to be further acknowledged and strengthened to enable swift response through consultation with related ministries and local governments. There is also a need to better mobilize public and private resources during an infectious disease outbreak or a public health emergency.

IHR coordination, communication and advocacy

Introduction

The effective implementation of the IHR requires multisectoral/multidisciplinary approaches through national partnerships for efficient and alert response systems. Coordination of nationwide resources, including the designation of a national IHR focal point, which is a national centre for IHR communications, is a key requisite for IHR implementation.

Target

Multisectoral/multidisciplinary approaches through national partnerships that allow efficient, alert and responsive systems for effective implementation of the IHR (2005). Coordinate nationwide resources, including sustainable functioning of a national IHR focal point – a national centre for IHR (2005) communications which is a key requisite for IHR (2005) implementation – that is accessible at all times. States Parties provide WHO with contact details of national IHR focal points, continuously update and annually confirm them.

Republic of Korea level of capabilities

The ROK has a well-established system and a high level of capacity for IHR coordination, communication, and advocacy. Since the MERS outbreak in 2015, significant progress has been made in further advancing IHR implementation where important lessons learned have been translated into a number of concrete actions. One of these actions was the creation of a dedicated division in the KCDC for systematic information collection and ongoing risk assessments. Since 2016, the IHR NFP has been transferred to the new Center for Public Health Emergency Preparedness and Response in KCDC which also oversees the ROK's progress for IHR (2005) implementation. Specifically, the Division of Risk Assessment and International Cooperation in this new center serves as the primary IHR NFP for triaging and assessing risks of events, and reporting to WHO IHR Contact Point with multisectoral involvement.

Standard operating procedures (SOPs) for IHR NFP coordination and communication are in place, and have been regularly updated and tested in exercises and real-life events with an emphasis on multisectoral coordination, collaboration, and information sharing with related ministries and agencies. Regular updates on IHR implementation status including the annual IHR progress reporting and this JEE, are also conducted through multisectoral approaches.

Recommendations for priority actions

- Advance IHR implementation for health security by enhancing the existing multisectoral and multidisciplinary arrangements.
- Sustain the key function of the IHR NFP in event communications, public health emergency preparedness and response, and in IHR monitoring and evaluation.
- Ensure sustainable investment in health security through contribution to regional and international information sharing, risk assessment and coordinated response to public health emergencies.

Indicators and scores

P.2.1 A functional mechanism established for the coordination and integration of relevant sectors in the implementation of IHR – Score #: 5

Strengths/ best practices

- Well-functioning multisectoral IHR communication and coordination mechanisms have been established to address the IHR requirements for all acute public health events and emergencies of national or international concern.
- The ROK has a fully functional IHR NFP. The country has notified WHO of real-life events such as pandemic H1N1 in 2009 and the MERS cases in 2015 in a timely manner. The IHR NFP has also participated in the annual regional IHR Crystal Exercise. The SOPs for IHR NFP coordination and communication have been updated, tested and are currently in operation.
- Since the outbreak of avian influenza in 2003, regular communication and cooperation mechanisms among the MOHW (through the KCDC), Ministry of Agriculture, Food and Rural Affairs (MAFRA), and Ministry of Environment (MoE) has been established and are operational.
- The lessons learned from the MERS outbreak in 2015 have been translated into a number of important national actions to strengthen IHR coordination and communication. The new Division of Risk Assessment and International Cooperation was established for information collection and risk assessment. A new public health Emergency Operations Center (EOC) which operates 24/7, was also established in 2016 and enables timely reports to the WHO IHR Contact Point.
- The KCDC has been responsible for the annual IHR progress reporting and has coordinated the IHR JEE in 2017.
- The ROK has established a Korea-China-Japan network for information sharing, joint research, and joint response. This collaborative network has enabled timely joint response to infectious disease threats when infected individuals travel across the three countries such as during the MERS outbreak in 2015.

Areas that need strengthening/ challenges

- Sustaining and advancing IHR implementation for health security through further enhancing and testing the existing mechanisms for IHR coordination, communication, and advocacy.
- There is a need to strengthen the channels for information sharing beyond the Asia Pacific region. In this highly connected world, information sharing and coordinated risk assessment have become increasingly important in preparedness for, and response to, emerging disease outbreaks and public health emergencies.

Antimicrobial resistance

Introduction

Bacteria and other microbes evolve in response to their environment and inevitably develop mechanisms to resist being killed by antimicrobial agents. For many decades, the problem was manageable as the growth of resistance was slow and the pharmaceutical industry continued to create new antibiotics.

Over the past decade, however, this problem has become a crisis. Antimicrobial resistance is evolving at an alarming rate and is outpacing the development of new countermeasures capable of thwarting infections in humans. This situation threatens patient care, economic growth, public health, agriculture, economic security and national security.

Target

Support work coordinated by FAO, OIE and WHO to develop an integrated global package of activities to combat antimicrobial resistance, spanning human, animal, agricultural, food and environmental aspects (i.e. a One Health approach). Each country has: (i) its own national comprehensive plan to combat antimicrobial resistance; (ii) strengthened surveillance and laboratory capacity at the national and international levels following international standards developed as per the framework of the Global Action Plan; and (iii) improved conservation of existing treatments and collaboration to support the sustainable development of new antibiotics, alternative treatments, preventive measures and rapid point-of-care diagnostics, including systems to preserve new antibiotics.

Republic of Korea level of capabilities

The ROK has adopted a One Health approach to combat antimicrobial resistance (AMR) for more than one decade through the implementation of the National AMR Safety Management Program since 2003. The programme has been implemented in five-year phases, with the first five-year programme (2003-2007) having focused on understanding the current situation regarding the volume of antibiotic consumption and AMR in human, animals, food and agricultural production so a plan can then be developed. Important progress was made during this first phase where the ROK built public awareness around AMR and collaborated with stakeholders both locally and internationally in both the human and animal health sectors. In phase two (2008-2012), the focus was on antibiotics usage management, infection control in the healthcare setting, and food safety.

In 2016, in response to the WHO's Global Action on AMR, the ROK developed the National AMR Management Action Plan (2016-2020) to build upon the progress made to date. This plan focuses on preventing the emergence and spread of AMR pathogens in human and animals; promoting the early detection of AMR through AMR surveillance programmes; and supporting the formulation of policies that are consistent with the One Health approach. To support this initiative, the AMR Awareness Campaign Head Office was also established in 2016 to shape the perception toward antibiotics among the various stakeholders and end-users. This office currently also organizes the AMR Forum to ensure the successful implementation of the various activities from the action plan.

In the ROK, both the human and animal health sectors have various surveillance systems to monitor AMR trends. In the human health sector, AMR surveillance systems have been implemented in public and private hospitals across the ROK since the late 1990s with six surveillance systems currently ongoing. Under the National AMR Management Action Plan, the top priority bacteria have been identified after consultations with experts, and include Methicillin-Resistant Staphylococcus aureus (MRSA), Vancomycin-

resistant Staphylococcus aureus (VRSA), Vancomycin-Resistant Enterococci (VRE), Carbapenem-resistant Enterobacteriaceae (CRE), Multidrug-resistant Acinetobacter baumannii (MDRAB), multi-drug resistant Pseudomonas aeruginosa (MDRPA), Campylobacter spp., and Salmonella spp. In the animal health sector, AMR monitoring is currently being conducted in both healthy and diseased animals, carcasses, and retail meats including imported meats. All species of livestock are included, and antimicrobial susceptibility testing is conducted for priority pathogens such as Escherichia coli, Staphylococcus aureus, Salmonella spp., among others. Laboratory capacities of both sectors are well developed with satellite laboratories distributed throughout the country and the National Research Institute of Health of the KCDC operating as the national laboratory.

Guidelines for human healthcare-associated infection (HCAI) prevention and control program were developed and implemented in 2002, and various infection control training programmes are in place for healthcare workers. The Korean National HCAI Surveillance System (KONIS) has also been implemented through a collaborative private-public partnership. In the animal sector, similar guidelines have also been developed and implemented for accreditation of good farm management. AMR stewardship programmes have been in place for more than a decade to reduce antibiotic use in both sectors; these include measures such as public disclosure of the healthcare providers' antibiotic prescription rate, and phasing out the use of various antibiotics in animal feed and veterinary prescription in the animal sector.

Recommendations for priority actions

- Monitor the implementation of the National Action Plan 2016 – 2020 to achieve the high targets set for both human health and agriculture sectors, as indicated in the plan.
- Maintain and strengthen the One Health approach needed in promoting antimicrobial stewardship, implementing AMR surveillance, and encouraging information sharing.
- Document antimicrobial usage in agriculture (livestock, aquaculture, crops) at the farm level to better design stewardship and surveillance programmes.

Indicators and scores

P.3.1 Antimicrobial resistance detection – Score 5

Strengths/ best practices

- The ROK has implemented the National AMR Management Action Plan in August 2016 to combat AMR using a One Health approach.
- Both human and animal health sectors have the capacity to detect AMR for all priority AMR pathogens.

Areas that need strengthening/ challenges

- The One Health approach is needed to further strengthen the comprehensive surveillance systems of the various agencies involved in AMR for livestock, agriculture, food, environment and human health.
- There is a need to further strengthen standardization and training for analytic methods including antimicrobial susceptibility testing at the national level.
- There is a need to further strengthen AMR testing in the aquaculture sector, which may include having a standardized laboratory and training for antimicrobial susceptibility testing in aquaculture.

P.3.2 Surveillance of infections caused by antimicrobial-resistant pathogens – Score 5

Strengths/ best practices

- The ROK has laws in place to enforce mandatory reporting of all major AMR incidents in the human health sector.
- The ROK's National Notifiable Infectious Disease Surveillance System (NNIDSS) covers all the pathogens in the WHO's global priority AMR pathogen list.
- AMR surveillance in livestock commenced as early as 2003, and in aquaculture in 2008.
- Both the human and animal health sectors have capacities to detect AMR with each having a national laboratory and a network of satellite laboratories.

Areas that need strengthening/ challenges

- There is a need to strengthen the human resource and infrastructure required to implement a dedicated AMR surveillance system in aquaculture. Strategic prioritization of AMR pathogens and aquatic species for monitoring is needed to ensure good resource management given the wide variety of aquatic organisms that are raised in aquatic farms nationwide.

P.3.3 Health care-associated infection (HCAI) prevention and control programmes – Score 5

Strengths/ best practices

- As part of the reform of the National Infectious Disease Control System, measures have been implemented to strengthen the prevention and management of HCAIs.
- In the agriculture sector, guidelines for accreditation of good farm management for pig farms, layer poultry farms, and beef/dairy cattle farms have been developed and implemented.
- Public-private partnerships are maintained through forums for infection control and AMR management.

Areas that need strengthening/ challenges

- It may be necessary to strengthen the infrastructure for effective infection prevention management programmes through the expansion of medical institutions with personnel dedicated to infection control. Similar support may also be needed in the animal sector as part of the good farm management accreditation.
- It may be necessary to expand the support system for HCAI prevention and control such as having infection control consultation services available for small and medium-sized medical clinics.

P.3.4 Antimicrobial stewardship activities – Score 4

Strengths/ best practices

- The ROK has been monitoring antibiotic prescription rate for different types of conditions and antibiotics. Evaluation findings have also been disclosed publicly to encourage appropriate prescription of antibiotics in medical institutions.
- Prescriptions for antibiotic use in the animal sector has commenced; this follows a phased approach to gradually reduce antibiotic use among animals.
- Quality improvement support activities are continuously carried out and target medical institutions with poor evaluation results.
- A national plan for the period 2016 - 2020 has been developed and launched. This plan includes targets that need to be monitored closely by both the human and animal health sectors.

Areas that need strengthening/ challenges

- It may be necessary to further understand the landscape of AMR generation in the ROK through linking antibiotic prescription data and the AMR database from KCDC.
- It is necessary to monitor whether antibiotics used in aquatic animals cause resistance in aquatic organisms, and provide evidence-based guidance and annual education on the use of medicines among the aquatic sector.
- It may be necessary to monitor, further understand, and manage potential AMR-driving contaminants in the environment which may also play a role in generating clinically significant AMR. This may be done through conducting more environmental surveys and analysis, as well as developing new technologies as needed.

Zoonotic diseases

Introduction

Zoonotic diseases are communicable diseases that can spread between animals and humans. These diseases are caused by viruses, bacteria, parasites and fungi carried by animals, insects or inanimate vectors that aid in its transmission. Approximately 75% of recently emerging infectious diseases affecting humans is of animal origin; and approximately 60% of all human pathogens are zoonotic.

Target

Adopted measured behaviors, policies and/or practices that minimize the transmission of zoonotic diseases from animals into human populations.

Republic of Korea level of capabilities

The ROK has designated ten priority zoonotic diseases in the country, including anthrax, severe acute respiratory syndrome (SARS), animal influenza with human infection, tuberculosis (Mycobacterium bovis), Enterohemorrhagic Escherichia coli, Japanese encephalitis, brucellosis, rabies, variant Creutzfeldt-Jakob disease, and Q fever. To facilitate information sharing and collaboration for the detection, prevention and response to zoonotic disease events between the human and animal health sectors, the KCDC and the Animal and Plant Quarantine Agency (APQA) established the Zoonotic Disease Committee in 2004. In 2017, the National Institute of Environmental Research (NIER) joined the committee, enabling the ROK to apply a One Health Approach for zoonotic disease events in animals and/or humans in the country.

The ROK has established disease-specific guidelines for notification, epidemiological investigations, laboratory diagnosis, and control measures for the ten zoonotic diseases. Investigations in animals are carried out by the Ministry of Agriculture, Food and Rural Affairs (MAFRA) and APQA. Responses to zoonotic events are conducted based on an existing preparedness plan in cooperation with related ministries/agencies and private organizations, as needed. These include the MAFRA, Ministry of the Interior and Safety (MoIS), Ministry of National Defence (MoND), KCDC, MoE, related local governments, Livestock Health Control Association, National Agricultural Cooperative Federation, and the Rural Development Administration. Laboratory tests for known and novel zoonotic pathogens are carried out by the KCDC and the 17 Research Institutes of Health and Environment (RIHEs) for human specimens and by APQA for animal specimens. The sharing of animal and human health data is accomplished via the linkage between the Infectious Disease Integrated Management System of the KCDC and the Korea Animal Health Integrated System (KAHIS) of the APQA. The Wildlife Disease Information Sharing System currently being developed by the NIER is also planned to be connected to these systems in the near future.

Recommendations for priority actions

- Further strengthen the function of the Zoonotic Disease Committee for multisectoral collaboration with the KCDC under the MOHW, MoE, MAFRA, and APQA through regular meetings, to improve the ongoing information exchange, joint risk assessments, prioritization and implementation of actions for zoonotic diseases.
- Reinforce surveillance and detection for suspicious zoonotic events, and develop laboratory testing algorithm for unknown pathogens.
- Strengthen real-time data sharing of zoonotic events between the human and animal health sectors.
- Continue and enhance collaboration between the field epidemiology training programme (FETP) and

veterinary training to strengthen the One Health approach for zoonosis outbreak response in the ROK. Specifically, consider including veterinary staff into the national rapid response teams (RRTs) and having them join outbreak investigation activities in the ROK.

Indicators and scores

P.4.1 Surveillance systems in place for priority zoonotic diseases/pathogens – Score 4

Strengths/ best practices

- The surveillance system for zoonotic diseases has been established and is operated by several ministries. Coordination and communication between ministries are conducted electronically and through the Zoonotic Disease Committee, which was established to enable collaboration among the human-animal-environmental sectors.
- The ROK has experience in detecting and responding to zoonotic disease outbreaks. For outbreaks of high public health threat, a multisectoral Incident Management System (IMS) is implemented to share information, conduct risk assessments and respond to the event.

Areas that need strengthening/ challenges

- The Wildlife Disease Information Sharing System of the NIER is currently under development and is planned to be completed by the end of 2018. Integration with the existing human and animal health systems will be required after completion.
- Once a comprehensive, integrated system is established for real-time information sharing between the human and animal health sectors, a pilot study for field implementation may need to be conducted.

P.4.2 Veterinary or animal health workforce – Score 4

Strengths/ best practices

- The veterinary and FETP curriculum and training programmes in each ministry have incorporated topics on zoonotic disease preparedness and response. There is also integration between the FETP and veterinary programmes where veterinarians can complete the full FETP training.

Areas that need strengthening/ challenges

- To enhance the capacity of government officers, joint education of public health and animal health staff continues to be necessary.

P.4.3 Mechanisms for responding to infectious and potential zoonotic diseases established and functional – Score 4

Strengths/ best practices

- A multisectoral response has been implemented and tested for avian influenza outbreaks in poultry. The IMS successfully hosted daily meetings to coordinate and facilitate collaboration among ministries.
- Rapid risk assessment has been conducted for reported cases infected with the avian influenza virus or subtypes that may have a potential risk of introduction to the ROK. In response to the rapid spread of avian influenza among poultry along the western coast region of the country, the central epidemiological investigation team was expanded and received strict pre-deployment training.
- The ROK has clear mechanisms and response plans for responding to known zoonotic pathogens. Compensation schemes for livestock owners are also in place for animal outbreaks.

Areas that need strengthening/ challenges

- Relevant organizations including KCDC, APQA, and the NIER may need to improve their existing systems for detecting and responding to novel zoonotic disease of unknown origin.
- The mechanisms and algorithms for the detection of novel zoonotic pathogens will need to be developed.
- Joint response systems for potential zoonotic disease pathogens will need to be developed.

Food Safety

Introduction

Food- and water-borne diarrhoeal diseases are leading causes of illness and death, particularly in less developed countries. The rapid globalization of food production and trade has increased the potential likelihood of international incidents involving contaminated food. The identification of the source of an outbreak and its containment is critical for control. Risk management capacity with regard to control throughout the food chain continuum must be developed. If epidemiological analysis identifies food as the source of an event, based on a risk assessment, suitable risk management options that ensure the prevention of human cases (or further cases) need to be put in place.

Target

Surveillance and response capacity among States Parties for food- and water-borne disease risks or events by strengthening effective communication and collaboration among the sectors responsible for food safety, and safe water and sanitation.

Republic of Korea level of capabilities

In the ROK, there is a sophisticated and well-established food safety management system where the Ministry of Food and Drug Safety (MFDS) takes the lead to coordinate food safety issues with other relevant agencies, including the MAFRA, Ministry of Oceans and Fisheries, MoE, and the KCDC.

A Food Safety Accident Emergency Response System exists along with a Food Safety Accident Emergency Response Manual, which ensures a coordinated, rapid and systematic emergency response to food safety events from the national to the local levels. The electronic Food-borne Disease Report Management System and the Integrated Disease and Health Management System allow real-time data linkage, connecting the MFDS, KCDC, local governments, RIHEs, and public health centers. The Emergency Reporting System on Hazardous Food also feeds real-time investigation findings from a network of 101 private and 36 public diagnostic testing agencies to the relevant agencies to trigger timely public health response. This includes the Hazardous Food Sales Prevention System which automatically prohibits the sale of food items reported for recall at food distributors and stores around the country. Regular training and exercises are conducted to improve responses to food- and water-borne disease outbreaks and to test system functioning.

Many highly sophisticated food-borne disease early warning, monitoring, and analysis mechanisms have also been established and feed real-time data to the relevant agencies. These include VibrioNet, PulseNet Korea, and the Korea Integrated Pathogen Information Networks (KIPIN) which allows the comparative analysis of pathogen strain profiles to aid outbreak investigations.

To ensure open communication with different stakeholders regarding food safety issues, the ROK has established various communication channels including online platforms where relevant government ministries/agencies, consumer organizations, academia, and businesses can be informed in real-time on food safety issues or to discuss policy changes.

Recommendations for priority actions

- Maintain and continue to advance the close collaboration and operational links between the different ministries under the National Food Safety Management System, including the functional mechanisms for detecting and responding to food-borne disease outbreaks and food safety events.
- Consider conducting joint simulation exercises to test the existing multisectoral mechanisms to respond to a large-scale food safety event that may constitute a public health emergency of international concern (PHEIC). Elements to be considered for the simulation exercise may include rapid information sharing, joint risk assessment, the decision-making process for activating and coordinating a response to a food safety emergency, operational communication between the IHR NFP and International Food Safety Authorities Network (INFOSAN), and risk communication.
- Consider exploring a regional or global cooperation on an integrated food safety management system to address the ROK's concerns on the safety of food purchased through e-commerce.

Indicators and scores

P.5.1 Mechanisms for multisectoral collaboration established to ensure rapid response to food safety emergencies and outbreaks of food-borne diseases – Score 5

Strengths/ best practices

- The ROK effectively utilizes highly advanced information technology in the country in its monitoring, rapid reporting, response, and public communication systems to ensure food safety.
- The food-borne disease management system exists where food-borne disease outbreaks can be predicted through big data analysis in real-time, which is then rapidly disseminated to the public and relevant government agencies. Included in this system are the food-borne disease prediction map and the food-borne disease early warning system.
- Two-way communication with the general public using social network services is available to increase community awareness and preparedness to respond to food safety issues.

Areas that need strengthening/ challenges

- The ROK is highly dependent on imported food, and the online purchase of food products from overseas is steadily increasing. There is a need to address safety concerns for food purchased through e-commerce which does not go through formal customs clearance procedures.
- There may be a need to further strengthen risk communication during food safety events.

Biosafety and biosecurity

Introduction

It is vital to work with pathogens in the laboratory to ensure that the global community possesses a robust set of tools – such as drugs, diagnostics, and vaccines – to counter the ever-evolving threat of infectious diseases.

Research with infectious agents is critical for the development and availability of public health and medical tools that are needed to detect, diagnose, recognize and respond to outbreaks of infectious diseases of both natural and deliberate origin. At the same time, the expansion of infrastructure and resources dedicated to work with infectious agents have raised concerns regarding the need to ensure proper biosafety and biosecurity to protect researchers and the community. Biosecurity is important in order to secure infectious agents against those who would deliberately misuse them to harm people, animals, plants or the environment.

Target

A whole-of-government national biosafety and biosecurity system with especially dangerous pathogens identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach conducted to promote a shared culture of responsibility, reduce dual-use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country-specific biosafety and biosecurity legislation, laboratory licensing and pathogen control measures in place as appropriate.

Republic of Korea level of capabilities

The ROK has multiple laws, decrees and guidance documents that regulate biosafety and biosecurity (or Biorisk management) in the country. Taken together these form a comprehensive system that covers all sectors working with biological agents which, if handled without appropriate safeguards, could threaten the health of humans, livestock, crops, aquaculture or the natural living ecosystem.

Human pathogen use in the ROK is regulated by the MOHW under the Infectious Disease Control and Prevention Act and the Act on the Promotion of Collection, Management, and Utilization of Pathogen Resources. Animal pathogens and plant pathogens are regulated by the MAFRA under the Act on the Prevention of Contagious Animal Diseases, the Plant Protection Act, and the Act on the Preservation, Management and Use of Agro-bioresources. Likewise, specific ministries/agencies have also been assigned to regulate aquatic pathogens, wildlife animal pathogens, laboratory animals, select agents and toxins, and living modified organisms (LMOs) under various laws.

In the ROK, laboratories and research facilities in the country must be registered with the government and are required by law to follow biosafety and biosecurity regulations and practices. Oversight of the laboratories is under the jurisdiction of different ministries depending on the biosafety level (BSL) and depending on whether they are commercial or public facilities. All organizations are required to prepare their own guideline for laboratory biosafety and biosecurity management based on KCDC's Laboratory Biosafety Guidelines which reflects the latest international regulations. Laboratory facilities of BSL 2 and above are obligated to designate an institutional biosafety officer and establish an Institutional Biosafety Committee which has the authority to stop the proposed work if it identifies biosafety or biosecurity concerns. Transportation of select agents is also strictly controlled under the Infectious Disease Control and Prevention Act and the Guidelines for Safe Transport of Infectious Substances. In addition, transportation of high-risk pathogens (HRPs) also requires the approval of the Institutional Biosafety Committee. General

and specialized training on laboratory safety, including that for HRPs, is implemented in accordance with various legislation. The ROK government has designated several private institutions to conduct biosafety and biosecurity training and has provided a budget to fund these activities.

For biosecurity management, individuals or agencies that wish to hold, use, or transfer biological agents and toxins must first be registered with the Ministry of Trade, Industry, and Energy under specific legislation that prohibits chemical and biological weapons. Periodic inspections are jointly carried out by the Ministry of Trade, Industry, and Energy and other ministries every two years. Manufacturers or holders of select agents must maintain and keep a detailed records of the production, imports, and exports for selected agents and submit them to the relevant government agencies. The Korea Biotechnology Industry Association is the designated operating body for biosecurity systems for select agents and toxins.

Recommendations for priority actions

- Finalize and publish the Korea Biosafety Standard and Guidelines with a comprehensive cross-sector review to ensure universal applicability in all facilities covered by the relevant biosafety and security regulations.
- Conduct training of trainers for biosafety officers and relevant oversight staff, and training for facility managers and workers, in all registered institutions after the publication of Korea Biosafety Standard and Guidelines.
- Consider conducting a review of biosafety and biosecurity regulations to identify potentially conflicting requirements in different regulations.[2]

Indicators and scores

P.6.1 Whole-of-government biosafety and biosecurity system in place for human, animal and agriculture facilities – Score 5

Strengths/ best practices

- The ROK has a well-established biosafety and biosecurity system based on a comprehensive set of legislation to protect public health, agriculture, and the environment. The ROK government implements a strong monitoring system under a dedicated annual budget for this activity.
- Pathogens are classified as human pathogens, animal pathogens (or both, i.e., zoonotic pathogens), plant pathogens, and controlled and categorized pathogens such as select agents, toxins, and LMOs which are managed by laws related to genetic modification and dual-use of pathogens.
- The KCDC collaborates with private sectors to produce integrated biosafety information such as the Korea Biosafety Standard and Guidelines which is currently under development.
- A risk assessment system has been implemented since 2014 to improve safety management within laboratories, in accordance with the Occupational Safety and Health Act and the Act on the Establishment of Safe Laboratory Environment.

Areas that need strengthening/ challenges

- In the ROK, biosafety and biosecurity are managed by several ministries in accordance with the area of expertise. However, this segmented/specialized system may weaken the compatibility of biosafety information. The collaboration mechanism among the responsible authorities may need to be further strengthened to enhance preparedness for a public health emergency.

2 There is a discrepancy in the different regulations regarding the conditions under which some high-threat/potential bioterror agents are to be handled/are allowed to be handled based on their risk group classification (discrepancy between high-threat pathogens and pathogens listed in Risk Groups 2 and 3).

- The ROK has laws in place to prohibit dual-use research of concern (DURC) for HRPs and all LMOs. However, it may be necessary to expand the application of DURC to all pathogens handled in the laboratories.

P.6.2 Biosafety and biosecurity training and practices – Score 4

Strengths/ best practices

- Specific biosafety and biosecurity education and training programmes have been designed and conducted across all research and commercial facilities handling LMOs.
- With the mandatory application of risk assessment systems in workplaces and laboratories in 2014, more systematic and prevention-focused biosafety and biosecurity education and training is now being conducted.
- Biosafety and biosecurity education and training is carried out by cooperation between the private sector and the ROK government.
- The Korea Biosafety Standard and Guidelines to be published in December 2017 aims to provide best practices and integrated information on biosafety issues and training.

Areas that need strengthening/ challenges

- With the mandatory application of risk assessment systems in workplaces and laboratories, there is a need to reflect the changes needed in the education/training for biosafety/biosecurity to shift to a workflow-oriented safety management system.

Immunization

Introduction

Immunizations are estimated to prevent more than two million deaths a year globally. Immunization is one of the most successful global health interventions and cost-effective ways to save lives and prevent disease.

Target

A national vaccine delivery system – with nationwide reach, effective distributions, access for marginalized populations, adequate cold chain and ongoing quality control – that is able to respond to new disease threats.

Republic of Korea level of capabilities

In the ROK, the National Immunization Programme (NIP) has steadily expanded since it was first established in 1954, and now includes a total of 20 vaccines of which 18 are provided for free. Free vaccination services are now not only provided at the public health centers; since 2014, they have also been expanded to approximately 19,700 private healthcare facilities across the country to increase accessibility. Foreign residents, including those without an alien registration card, are also offered free vaccinations along with vaccination guidelines available in nine languages.

The ROK has established an electronic Immunization Registry Information System (IRIS) which enables real-time monitoring of national and sub-national immunization coverage levels and vaccine supply. The IRIS also allows automated 'remind' and 'recall' text messages to be sent to the caregivers to ensure timely immunization, and provides information on the immunization status of children before school enrollment.

The ROK has made extensive efforts to enhance vaccine awareness and to reduce misinformation through annual awareness campaigns and information dissemination through the KCDC website, social media, and smartphone applications. The ROK conducts surveys every two to four years to better understand public perceptions concerning vaccines. Adverse Events Following Immunization (AEFI) are also monitored closely with rapid response, investigation and financial compensation for serious adverse events.

Through these efforts, the ROK has maintained a high vaccination coverage of over 95% for all childhood vaccines. The national vaccination coverage for the first dose of the measles, mumps, & rubella vaccine (MMR1) at 24 months of age was 96.9% in 2016, with all 17 provinces achieving a coverage of greater than 95%. In 2014, the ROK became the first Member State in the WHO Western Pacific Region to be certified as having achieved measles elimination.

Recommendation for priority action

- Consider narrowing the gap between the first and second doses of MMR vaccination (currently at the age of 12-15 months and 4-6 years) to prevent the accumulation of susceptible children.

Indicators and scores

P.7.1 Vaccine coverage (measles) as part of national programme – Score 5

Strengths/ best practices

- Comprehensive NIP is in place in the ROK with 20 vaccines in 2017.
- The IRIS with linkage to several other operational databases enables excellent monitoring of vaccination coverage and allows healthcare workers, schools and parents to easily access immunization records.
- Free vaccinations are available for all including foreigners, with vaccination guidelines provided in multiple languages.
- The ROK has consistently maintained a high vaccination coverage of over 95% for all childhood vaccines.
- In 2014, the ROK was certified as the first measles-free country in the WHO Western Pacific Region.

Areas that need strengthening/ challenges

- Continued close monitoring and effective strategies to counter misinformation are needed to address vaccine-hesitant groups, which recently emerged mainly from the online community.

P.7.2 National vaccine access and delivery – Score 5

Strengths/ best practices

- The vaccine stock status including those purchased, distributed, administered, and available can be monitored through the IRIS in real time, to allow forecasting of vaccine need.
- Through the Vaccine Management Council and Committee for the Safe Supply of National Essential Medicine, the KCDC can promptly respond to vaccine shortages including introducing new vaccines and revising the vaccination schedule.
- The KCDC works with central and local governments, suppliers, and private medical institutions to solve discrepancies in the regional vaccine supply.
- The KCDC conducts several programmes to ensure maintenance of the vaccine cold chain in both the public health centres and private healthcare facilities. These include the distribution of guidelines, training of relevant staff, field visits and inspections.

Areas that need strengthening/ challenges

- The ROK currently relies on the import of 70% of all necessary vaccines, and occasionally faces a delay in vaccine supplies from overseas manufacturers. To ensure a stable vaccine supply, the government continues to support research and development and is investing in infrastructure for vaccine production in the country.

DETECT

National laboratory system

Introduction

Public health laboratories provide essential services including disease and outbreak detection, emergency response, environmental monitoring and disease surveillance. State and local public health laboratories can serve as a focal point for a national system, through their core functions for human, veterinary and food safety including disease prevention, control and surveillance; integrated data management; reference and specialized testing; laboratory oversight; emergency response; public health research; training and education; and partnerships and communication.

Target

Real-time biosurveillance with a national laboratory system and effective modern point-of-care and laboratory-based diagnostics.

Republic of Korea level of capabilities

The ROK has a comprehensive, tiered system and a public and private laboratory network that is evenly distributed throughout the country. These laboratories collectively provide diagnostic services, support environmental monitoring and inspections, and form an essential part of the infectious disease surveillance system. The national reference laboratory is based at the KCDC, while the provincial laboratories are based at the 17 RIHEs, and the local laboratories at 256 public health centres, 298 hospitals, and other commercial facilities.

At the national level, the KCDC performs the role of the national reference laboratory and maintains a number of dedicated laboratory sentinel surveillance functions. The KCDC provides confirmatory testing as required, testing for HRPs, as well as testing of referral samples that local or provincial level laboratories cannot perform. In addition, the KCDC develops the standardization of laboratory testing, education and training, and the coordination of proficiency testing of laboratories at different levels. RIHEs function as provincial level laboratory hubs with a highly integrated One Health approach. RIHEs are able to perform a wide range of testing for both the human and veterinary health sectors, as well as conduct analyses on a wide range of environmental samples. Their roles include supporting outbreak investigations, food inspections, quality monitoring of air and water, as well as monitoring chemical and radioactive contamination. Local and provincial level laboratory results are reported to the KCDC and linked to physician reports as part of the regular surveillance system for infectious diseases.

The ROK has 80 nationally notifiable infectious diseases (120 pathogens) including zoonoses and high-risk pathogens, for which laboratory testing is available throughout the laboratory network. This list also includes the ten priority diseases as required by the IHR (2005). Specimen transport arrangements have also been established to ensure that samples can be sent from any part of the country to the reference laboratories within 24 hours. Rapid and modern diagnostic tests are widely available in the country, especially at the RIHEs. Point-of-care tests in the clinical settings are also increasingly used as bedside diagnostics.

Laboratory certification is required prior to operation, where a notification process is used for BSL 1 and 2 laboratories, and an approval system is required for BSL 3 and 4 laboratories. Separate registration

and permissions are required for handling LMOs, HRPs, animal, plant and aquatic pathogens, as well as performing work with laboratory animals. The permits and registration are managed by KCDC, the MOHW, Ministry of Science, ICT and Future Planning, the APQA, the MFDS and the Ministry of Oceans and Fisheries.

Almost all laboratories participate in voluntary national Quality Assessment and Monitoring Schemes and some in international schemes. Although not compulsory, strong guidance published by the KCDC has resulted in de facto requirements for participation in national external quality assurance (EQA) rounds and compliance to the nationally established quality standards. A number of laboratories at several levels have also accredited key parts of their services to conform to national or international quality standards. In the ROK, accreditation is also currently voluntary but strongly recommended.

Recommendations for priority actions

1. Consider evaluating the necessity for mandatory participation in EQA programmes conforming to international quality standards for both public and privately-operated public health, environmental health, veterinary and clinical microbiological laboratories, in the Republic of Korea context.
2. Explore opportunities to require accreditation of laboratory diagnostic services by independent bodies at all levels, including at the KCDC.
3. Consider increasing operational awareness between the KCDC and the Food and Drug Administration in relation to food and water-borne epidemics through various information exchange channels.
4. Consider implementing bio-banking of selected pathogens by sending primary specimens systematically to the KCDC for prospective and retrospective epidemiological analyses.

Indicators and scores

D.1.1 Laboratory testing for detection of priority diseases – Score 5

Strengths/ best practices

- The ROK has an extensive, integrated, and fully functional laboratory network from the national to the local level that is supported by legislation.
- The ROK is able to test all ten priority diseases as specified in the IHR (2005) and other national notifiable infectious diseases. RIHEs which have the higher level of capacity to perform laboratory testing for major infectious diseases are evenly distributed throughout the country.
- All ROK citizens are able to receive free laboratory testing services for infectious diseases.
- Laboratory testing criteria for nationally notifiable infectious diseases are described in the KCDC regulations, and KCDC regularly conducts training to transfer laboratory test methods to provincial laboratories.

D.1.2 Specimen referral and transport system – Score 5

Strengths/ best practices

- An efficient specimen transportation system for transferring specimens to the RIHEs and KCDC for confirmatory testing has been established throughout the country.
- For pathogens that cannot be tested locally, specimens can be transferred to the KCDC within 24 hours for confirmatory testing.

Areas that need strengthening/ challenges

- The KCDC is transporting specimens efficiently in accordance with the Guidelines for the Safe Transport of Infectious Diseases. However, guidelines and regulations for specimen transport at private institutions may need to be strengthened.

D.1.3 Effective modern point-of-care and laboratory-based diagnostics – Score 5

Strengths/ best practices

- The national laboratory system ensures access to laboratory testing, with RIHEs being densely distributed per capita to improve accessibility.
- The development of on-site diagnostic manuals and portable diagnostic kits have been considered as national priority tasks with various research and development projects currently ongoing.
- Most of the reagents required for laboratory testing can be produced in the ROK, and both domestic and foreign products can be procured through the national electronic procurement system.
- The ROK has provided support to other countries such as Mongolia and Cambodia for specialized laboratory testing.

D.1.4 Laboratory quality system – Score 4

Strengths/ best practices

- The ROK has developed national standards and legislation for establishing biological facilities, certifying and inspecting laboratories, and registering in vitro diagnostic medical devices.
- The KCDC regularly participates in various international EQA programmes to maintain a high standard and quality of laboratory tests for infectious diseases.
- Public laboratories are required by law to participate in the EQA programmes arranged by the KCDC. The ROK has also enacted legislation to encourage private medical institutions to participate in EQA programmes.

Areas that need strengthening/ challenges

- It may be beneficial for KCDC to further expand its participation in international EQA programmes.
- It may be necessary to expand the number of target pathogens for EQA programmes at the RIHEs to better ensure the quality of testing services at provincial laboratories.
- It may be useful to consider independent accreditation by international standards such as ISO 15189 to further enhance the testing capacity of the laboratories at the national level.

Real-time surveillance

Introduction

The purpose of real-time surveillance is to advance the safety, security and resilience of the nation by leading an integrated biosurveillance effort that facilitates early warning and situational awareness of biological events.

Target

Strengthened foundational indicator- and event-based surveillance systems that are able to detect events of significance for public health, animal health and health security; improved communication and collaboration across sectors and between sub-national, national and international levels of authority regarding surveillance of events of public health significance; improved country and intermediate level regional capacity to analyse and link data from and between strengthened, real-time surveillance systems, including interoperable, interconnected electronic reporting systems. This would include epidemiologic, clinical, laboratory, environmental testing, product safety and quality and bioinformatics data; and advancement in fulfilling the core capacity requirements for surveillance in accordance with the IHR and OIE standards.

Republic of Korea level of capabilities

Since 1954, the ROK established an infectious disease surveillance system supported by legislation. This system has provided data on infectious disease occurrence to inform disease prevention and control policy. In the past two decades, the ROK has increasingly utilized its strength in information technology (IT) in infectious disease surveillance. In 2000, KCDC established an IT-based system capable of reporting in real-time, thus ensuring the timeliness and completeness of surveillance data. In 2015, this system was then further developed to allow integration with surveillance data from other sectors. Since 2016, electronic automated reporting from healthcare facilities has also been implemented and is currently being expanded to reduce the burden of manual reporting on the healthcare workers.

Currently, the national notifiable infectious disease surveillance system (NNIDSS) in the ROK comprises a mandatory surveillance system, a sentinel surveillance system, and a complementary surveillance system. The Infectious Disease Control and Prevention Act mandates 80 types of infectious diseases (120 diseases total) to be reported by all public and private healthcare facilities and laboratories. The mandatory surveillance system monitors water-borne and food-borne infectious diseases, vaccine-preventable diseases, epidemic-prone and high-risk infectious diseases. The sentinel surveillance system monitors seasonal influenza, parasitic infectious diseases, and other designated infectious diseases such as sexually-transmitted diseases and antimicrobial-resistant infections. The complementary surveillance system monitors ophthalmologic infectious diseases. Since the surveillance system is IT-based, the reporting of healthcare facilities to local public health centres can be shared immediately with provincial levels as well as the KCDC. This reporting can also be linked with epidemiological investigation data as well as laboratory data.

In the animal health sector, the APQA also works with the provincial governments to conduct active surveillance on a number of zoonotic diseases and other livestock infectious diseases. Information has been actively shared between the human and animal health sectors, with the recent linkage of the KCDC's Infectious Disease Integrated Management System to the APQA's Korea Animal Health Integrated System (KAHIS) further improving real-time data sharing capabilities.

In addition to the indicator-based surveillance (IBS) system, an event-based surveillance (EBS) system and syndromic surveillance system are in place to detect potential public health threats. The syndromic surveillance system is based in emergency rooms across the country and designed to detect bioterrorism-related events. Dedicated teams in the KCDC and APQA analyze surveillance data to assess risks and produce regular reports for relevant stakeholders and the general public.

Recommendations for priority actions

- Consider longer staff postings for EBS and risk assessment to build competency and experience.
- Consider conducting regular reviews of the list of national notifiable infectious diseases.
- Consider making use of the syndromic surveillance system for additional purposes such as monitoring public health emergencies.

Indicators and scores

D.2.1 Indicator- and event-based surveillance systems – Score 5

Strengths/ best practices

- The surveillance system provides excellent coverage to detect infectious disease events in both the human and animal health sectors throughout the country.
- The EBS system is operated by a dedicated team in the EOC who monitors multiple sources of information including EBS 24/7 and conduct risk assessments.
- The ROK conducts continuous education of healthcare providers and those in charge of reporting to minimise reporting delays and under-reporting.

Areas that need strengthening/ challenges

- Given the large number of national notifiable infectious diseases and the need for prompt reporting, in 2016, an automated reporting system was established with 108 medical institutions currently participating in this system. There is a need to further expand this to more healthcare facilities.
- Frequent rotation of staff may pose a challenge for EBS which depends on having sufficient numbers of experienced staff.

D.2.2 Interoperable, interconnected, electronic real-time reporting system – Score 5

Strengths/ best practices

- The IT-based reporting system enables notifications to be visualized at all levels in real-time. It is also linked with data from epidemiological and laboratory investigations.
- Information sharing across the human and animal health sectors is enhanced through an interoperable and interconnected disease information system.

Areas that need strengthening/ challenges

- Although the local government reporting system is operated using an IT system, approximately half of the healthcare facilities are still reporting by fax. It is necessary to further improve this through the continuous promotion of IT system use and the expansion of the automated reporting system.

D.2.3 Integration and analysis of surveillance data – Score 5

Strengths/ best practices

- There are dedicated teams for the monitoring, analysis, risk assessment and reporting of surveillance data in both the human and animal health sectors.
- Infectious disease surveillance data is shared with the relevant departments and other organizations.
- Data is also shared with the general public through the Public Health Weekly Report, Sentinel Surveillance Weekly Newsletters, Infection Disease Surveillance Yearbook, and the real-time Infection Disease Web Statistics System (http://is.cdc.go.kr/dstat). When required, the ROK also uses press releases to provide appropriate information to the public in a timely manner.

Areas that need strengthening/ challenges

- Frequent rotation of staff may pose a challenge for risk assessment which depends on having sufficient numbers of experienced staff.

D.2.4 Syndromic surveillance systems – Score 4

Strengths/ best practices

- The syndromic surveillance system is robust with data currently reported from 131 Emergency Departments.
- Since the daily reporting system is based on an IT system, it is possible to detect potential national bioterrorism events; the data can also be used to produce daily, weekly, monthly, and regional statistics to identify trends of syndromic cases.

Areas that need strengthening/ challenges

- It may be useful to explore additional purposes for the large amount of real-time syndromic surveillance data collected.

Reporting

Introduction

Health threats at the human–animal–ecosystem interface have increased over the past decades, as pathogens continue to evolve and adapt to new hosts and environments, imposing a burden on human and animal health systems. Collaborative multidisciplinary reporting on the health of humans, animals and ecosystems reduces the risk of diseases at the interfaces between them.

Target

Timely and accurate disease reporting according to WHO requirements and consistent coordination with FAO and OIE.

Republic of Korea level of capabilities

The ROK has designated the Division of Risk Assessment and International Cooperation in KCDC as the IHR NFP since 2016, a change from the Center for Infectious Disease Control in the KCDC which had been the designated IHR NFP since 2006. The KCDC has comprehensive surveillance and risk assessment systems, as well as a roster of IHR duty officers who are available 24/7 to assess and notify national and international public health events in a timely manner. For animal health, the Director of the Division of Animal Health in the MAFRA is designated as the World Organisation for Animal Health (OIE) Delegate. For food safety, the Director of the Division of Risk Assessment in the MFDS is designated as the contact point of the Food and Agriculture Organization of the United Nations' (FAO) INFOSAN.

The ROK IHR NFP, OIE Delegate and INFOSAN contact point conduct regular formal and informal training for their officers. For the human health sector, the IHR duty officers participate in various international meetings and workshops, and in the annual regional IHR Exercise Crystal organized by WHO WPRO. On-the-job training is also received by Epidemic Intelligence Officers (EIOs) who are sent to the FETP training in WHO WPRO.

In the ROK, relevant systems, mechanisms, and networks are in place for fast and efficient reporting to WHO, FAO, and OIE. The ROK has demonstrated timely reporting to the WHO for previous events, including the H1N1 influenza pandemic in 2009, the humidifier disinfectant incident in 2011, and the MERS outbreak in 2015.

Recommendations for priority actions

- Consider further strengthening the role of IHR NFP to ensure effective coordination and communication with other sectors including agriculture, animal health, food and drug safety, points of entry (PoEs), public safety and security, environment, and other relevant sectors.
- Consider incorporating IHR verification, risk assessment, notification and reporting into the national joint training and simulation exercises for human and animal health professionals.
- Ensure decision-makers in both the human and animal health sectors are consulted in the risk assessment and decision-making process during a zoonosis event.

Indicators and scores

D.3.1 System for efficient reporting to FAO, OIE and WHO – Score 5

Strengths/ best practices

- IHR NFP, OIE Delegate, and INFOSAN contact point have been designated in the ROK to report to WHO, OIE, and FAO, respectively. The IHR NFP has reported previous potential PHEICs within 24 hours.
- There is a mechanism for rapid multisectoral information exchange and joint response including the assignment of liaison persons for different types of events. This collaboration mechanism has been particularly strong between the human and animal health sectors for zoonotic events.
- The ROK has comprehensive epidemiological and laboratory surveillance systems and early warning systems that support early identification, risk assessment, and timely reporting of a potential PHEIC.

Areas that need strengthening/ challenges

- Other sectors and external stakeholders should continue to be consulted and involved early in the risk assessment and decision-making process for zoonotic events and other public health emergencies.
- Joint training and exercises should continue to be conducted by the human health sector in collaboration with the animal health sector to further improve the understanding and implementation of reporting responsibilities to WHO, FAO, and OIE.

D.3.2 Reporting network and protocols in country – Score 5

Strengths/ best practices

- The ROK has a legal basis for IHR NFP and OIE Delegate reporting, stipulated under article 4-2 of the Infectious Disease Control and Prevention Act. SOPs for IHR (2005) reporting are also available in KCDC.
- The ROK IHR NFP function has been tested in both exercises and real events. The ROK has demonstrated effective IHR NFP functioning, including timely information collection and sharing, rapid risk assessments, and IHR notification.
- The ROK educates and trains their EIOs as IHR duty officers who are rotated through the EOC. IHR duty officers are responsible for information collection, risk assessment and event reporting on a daily and weekly basis.

Areas that need strengthening/ challenges

- The role of the ROK IHR NFP in coordinating and communicating information on chemical events and radiological events may need to be enhanced. In the ROK, the MoE and the Nuclear Safety and Security Commission (NSSC) are responsible for responding to chemical accidents and radiation incidents, respectively, while MOHW plays a supporting role.

Workforce development

Introduction

Workforce development is important in order to develop a sustainable public health system over time by developing and maintaining a highly qualified public health workforce with appropriate technical training, scientific skills and subject-matter expertise.

Target

States Parties with skilled and competent health personnel for sustainable and functional public health surveillance and response at all levels of the health system and the effective implementation of the IHR (2005).

Republic of Korea level of capabilities

The ROK has a substantial workforce of public health professionals, which is composed of a large number of medical practitioners, medical technicians, and epidemiologists. According to the Medical Act, all healthcare personnel are required by law to be qualified with national licenses.

Following the MERS outbreak in 2015, the ROK acknowledged the need to increase their workforce and since then has increased the number of KCDC staff to approximately 1,400 individuals responsible for prevention, investigation, quarantine, testing, and research of infectious diseases. At the sub-national level, KCDC has 115 staff in 17 provinces, 136 staff in 17 RIHEs, and 1,181 in 256 public health centres who are responsible for managing infectious diseases. As of June 2017, the ROK had approximately 100 EIOs and trainees, of which half are based at the provincial level. The animal sector has also increased their veterinarian workforce in recent years (see Zoonotic Diseases).

The ROK has developed three levels of public health training programmes: the public health basic course, the Field Management Training Program (FMTP) managers, and the FETP to train EIOs to enhance their capacity in epidemiological investigations. After the 2015 MERS outbreak, the minimum number of FETP fellows was fixed by law in the ROK. In addition, surge capacity has been made possible through mobilizing healthcare professionals in the private sector to supplement healthcare professionals in the public sector during emergencies.

Recommendations for priority actions

- Create a multidisciplinary[3], all-hazards, One Health, national public health workforce strategy that includes workforce from both the government and private institutions. This workforce strategy should include staff recruitment, training, utilization, and retention. The ROK may also consider creating an electronic roster of this workforce to be later integrated into the joint utilization system being developed by the MoIS. Ensure expanded inclusion of veterinarians into FETP and inclusion of additional disciplines in RRTs within this strategy.
- Reinforce and expand the FETP program, especially to increase the public health workforce at the sub-national level.

3 The workforce for ROK should include multiple disciplines including, but not limited to: epidemiology, clinical care, veterinary science, laboratory operations, infection prevention and control, biological sampling, social science, RRT team management, data management, data analysis and risk assessment, reporting, and emergency management. The emergency management workforce should include personnel trained as incident managers, logisticians, and risk communication specialists. Consider using mathematical modelling techniques to estimate the number of individuals needed, by discipline, based on different event scenarios.

- Enhance the process for sending, and develop the process for receiving, public health RRTs and emergency medical teams (EMTs), both within and outside of the ROK. This should take into consideration the necessary legal, regulatory, and medical procedures.

Indicators and scores

D.4.1 Human resources available to implement IHR core capacity requirements – Score 5

Strengths/ best practices

- The number of healthcare personnel is increasing due to the ROK's efforts in managing its healthcare workforce at the national level.
- Since the MERS outbreak in 2015, the central government has elevated the KCDC to the vice-ministerial level and established the Center for Public Health Emergency Preparedness and Response, which oversees outbreak situations. Since 2015, a total of 76 new staff were recruited, including 30 EIOs at the central level and 46 officers in charge of infectious diseases.
- The introduction of new EIOs as full-time staff instead of relying on public health physicians who worked as EIOs through the 3-year military service commitment, has ensured the sustainability of a workforce of experienced officers.

Areas that need strengthening/ challenges

- Turnover of medical staff and KCDC staff remains high as there is a rotational policy for public officers who are rotated every two to three years.
- There is a need for long-term strategies to strengthen epidemiological investigation capacity of EIOs, especially at the sub-national level. Some provinces are facing difficulties in recruiting EIOs and other experienced public health workforce due to an imbalance of healthcare professionals at the sub-national level.
- More public health workforce is needed at the sub-national level. The MoIS is currently in the process of implementing a plan to recruit a total of 366 people in charge of infectious diseases at the sub-national level.

D.4.2 FETP or other applied epidemiology training programme in place – Score 5

Strengths/ best practices

- Three-level educational training programmes (public health basic course, FMTP, and FETP) are being conducted to train public health responders.
- A separate training of senior managers of local governments on public health emergency response has also been carried out since 2016.
- In collaboration with private sectors, various other training courses are also being provided to hospital staff for managing healthcare-associated infections, and emerging and re-emerging infectious diseases.

Areas that need strengthening/ challenges

- Since the timing of the appointment and recruitment of EIOs is different at the local government, it is difficult to coordinate the timing of the basic and continuing training courses. To address this issue, currently, the basic education programme has been increased from once to three times a year. Two additional advanced courses were also recently added.
- Although the FETP fellows participate in epidemiological investigations under the supervision of the public command officer and the mentorship of a senior EIO, it is still a challenge to provide them with adequate technical guidance to ensure they have the competency needed for field investigation.

D.4.3 Workforce strategy – Score 4

Strengths/ best practices

- Basic and advanced training courses, including on-the-job training, are provided for newly assigned and existing public health officers.
- Surge capacity exists within the private sector to overcome the problem of the shortage of healthcare professionals in the public sector. During emergencies, the central and local governments can request specialized personnel in medicine or nursing from both the public and private sectors to temporarily engage in treatment and epidemiological investigations as needed. A system to train and collaborate with experts in the private sector has been well-established.
- The ROK deployed members of the Korean Disaster Relief Team (KDRT) to West Africa in 2014 through the Global Outbreak Alert and Response Network (GOARN) to respond to the Ebola outbreak in West Africa.

Areas that need strengthening/ challenges

- Although programme-focused strategies and plans to train healthcare workers are established, there is a need to develop a more comprehensive strategy and plan for the overall public healthcare workforce, including other technical disciplines at both the national and sub-national levels.
- There is a need to integrate the workforce across the 15 Ministries and between public and private institutions. It may be useful to create an electronic roster of workforce members by discipline, experience, and location to facilitate rapid utilization of the workforce as needed during an emergency.
- The workforce strategy may need to address high turnover of staff and retention plans for experienced staff, perhaps through an incentive or support system that can encourage experts to stay in the workforce.

RESPOND

Preparedness

Introduction

Preparedness includes the development and maintenance of national, intermediate and community/primary response level public health emergency response plans for relevant biological, chemical, radiological and nuclear hazards. Other components of preparedness include mapping of potential hazards, the identification and maintenances of available resources, including national stockpiles and the capacity to support operations at the intermediate and community/primary response levels during a public health emergency.

Target

Development and maintenance of national, intermediate (district) and local/primary level public health emergency response plans for relevant biological, chemical, radiological and nuclear hazards. This covers mapping of potential hazards, identification and maintenance of available resources, including national stockpiles and the capacity to support operations at the intermediate and local/primary levels during a public health emergency.

Republic of Korea level of capabilities

The ROK has established and continues to maintain an extensive hierarchy of plans and procedures to prepare for and respond to various disasters and emergencies. The Master Plan for National Safety Management provides a framework for preparedness and response planning for all natural and human-made disasters. The Framework Act on the Management of Disasters and Safety and the Framework Guideline for National Crisis Management provide goals and directions for national emergency management and the emergency alert system. Each ministry/agency is also required to establish a Standard Manual for Crisis Management for each type of emergency for which it is responsible.

The MOHW, the ministry in charge of managing public health emergencies caused by emerging infectious diseases, is responsible for maintaining the Standard Manual for Infectious Disease Emergency Management. This manual identifies the roles and responsibilities related to different emergency alert levels (Blue, Yellow, Orange, and Red). Other Ministries are responsible for leading responses to public health emergencies originating from other sources such as chemical, radiation, and food safety threats. The Ministry of Interior and Safety is responsible for ensuring all Ministry plans are consistent and not in conflict with each other. Each Ministry issues planning guidance and reviews plans created at sub-national levels within their sector of responsibility.

For major public health threats, stockpiles of appropriate medical countermeasures, equipment, and other supplies are maintained at all levels of government, from the Strategic National Stockpile to stocks maintained at local public health centres. Each sector is also responsible for maintaining stockpiles for responses to threats under their sector. A joint resource utilization system was initiated in 2014 to coordinate inventory management and material deployment across sectors and is currently in the process of implementation.

Recommendations for priority actions

- Establish an annual schedule to update the national risk profiles and resource requirements based on annual reviews of public health threats across all sectors.
- Clarify authorities at each level of government to carry out each organization's roles and responsibilities when multiple levels of government are involved in a response.
- Expand the existing exercise programme to integrate all supporting sectors and partners, to integrate exercises between different levels of government, and to track the progress of necessary improvements.
- Complete the development of the national resource utilization system to support coordinated resource requisition, mobilization, and deployment at all levels of government and across all sectors.

Indicators and scores

R.1.1 National multi-hazard public health emergency preparedness and response plan developed and implemented – Score 5

Strengths/ best practices

- The roles and responsibilities of each ministry/agency for each type of emergency are clearly defined in the Framework Act on the Management of Disasters and Safety, the Framework Guideline for National Crisis Management, and the Master Plan for National Safety.
- All ministry/agency emergency response plans and manuals are based on a four-level color-coded system that is common to all ministries/agencies. Each ministry/agency develops detailed emergency response plans for their areas of lead responsibility, outlining the roles and responsibilities of both the lead and supporting ministries/agencies, at each color-coded level of severity of the emergency.
- During an emergency, multisectoral collaboration can be initiated upon request by the lead ministry. The MoIS provides the means to enable this collaboration through the national EOC. This collaboration mechanism is also available in crosscutting emergency situations such as during an avian influenza outbreak, where multiple ministries/agencies may have lead responsibilities within their respective sectoral areas.

Areas that need strengthening/ challenges

- Clarification of roles and relationships between central and local governments is needed for situations where multiple levels of government may be simultaneously responding to a given emergency.
- Possible gaps in policies, plans, and procedures need to be continuously identified both through exercises and from actual responses, to continue to improve existing systems.

R.1.2 Priority public health risks and resources mapped and utilized – Score 3

Strengths/ best practices

- Eleven priority infectious diseases have been identified by the KCDC, forming the basis for planning and resource stockpiling. The KCDC has established a Strategic National Stockpile with medical countermeasures and personal protective equipment (PPE) relevant to these eleven diseases. A long-term plan is also updated every two years to expand this stockpile. Similar stockpiles exist in other sectors for chemical and radiation emergencies.
- The ROK has identified relevant healthcare facilities for different types of public health emergencies, such as hospitals with isolation facilities for infectious disease outbreaks and designated hospitals to treat patients in the event of a radiation emergency.

- The KCDC can currently track equipment that may be needed during a public health emergency such as negative pressure carts and negative pressure isolation-type carriers. The KCDC is able to share this information for effective and efficient utilization of resources during emergencies.
- A joint utilization system is under development at the national level to enable sharing of resources relevant to multiple emergencies between all ministries/agencies, with plans to expand this system to include the private sector.

Areas that need strengthening/ challenges

- There is currently no system capable of monitoring in real time, the status of national stockpiles at all levels of government. The joint utilization system currently being developed will be critical to address this.
- There is a need to secure sufficient budget for the development and maintenance of planned regional infectious disease hospitals.

Emergency response operations

Introduction

A public health emergency operations centre is a central location for coordinating operational information and resources for strategic management of public health emergencies and emergency exercises. Emergency operations centres provide communication and information tools and services, and a management system during a response to an emergency or emergency exercise. They also provide other essential functions to support decision-making and implementation, coordination and collaboration.

Target

Country with public health emergency operations centre (EOC) functioning according to minimum common standards; maintaining trained, functioning, multisectoral rapid response teams and "real-time" biosurveillance laboratory networks and information systems; as well as trained EOC staff capable of activating a coordinated emergency response within 120 minutes of the identification of a public health emergency.

Republic of Korea level of capabilities

Following the MERS outbreak in 2015, the ROK implemented a series of concrete actions under the reform of the National Infectious Disease Control System. This included the establishment of a strong and well-functioning public health EOC located at the KCDC to support the inter-governmental coordination of information and resources during public health emergencies.

The ROK has made significant progress in establishing the necessary regulations, processes, infrastructure, and human resources to operate the EOC for public health emergency response. These include the Regulation on EOC Operations which outlines the command and control system, roles and responsibilities, and human resource allocation of the EOC. The EOC operation manual further specifies the roles of EOC staff as well as the procedures for emergency response to different types of events. The EOC operates 24/7, and the staff continuously monitors and conducts risk assessments on national and international events that may cause public health concern. The EOC activation process is done in accordance with the Framework Act on the Management of Disasters and Safety and the Standard Manual for Infectious Disease Emergency Management. Once the EOC is activated, an IMS is established according to the level of activation. The ROK also has in place ten RRTs which have been trained to respond to a variety of infectious disease emergencies.

Since the establishment of the EOC, the EOC has been activated 10 times, and various exercises have been conducted to test EOC function and to strengthen the capacities of the EOC staff. Plans are currently in place to build a larger facility which will replace the current 34-seat facility in the near future.

Recommendations for priority actions

- Expand training to include senior officials and other staff within the KCDC who will work under the IMS once the EOC is activated, such as incident command and other supporting roles.
- Review the resources required to initiate, escalate and maintain a sustainable public health EOC at all levels during a protracted public health emergency.
- Consider developing a database to capture information related to EOC management and operations to include information such as registers of trained staff, contact details of subject matter experts, and tracking of allocated resources.

Indicators and scores

R.2.1 Capacity to activate emergency operations – Score 5

Strengths/ best practices

- The KCDC has operated the EOC 24/7 since its establishment following the MERS outbreak in 2015, in accordance with the WHO's Framework for a Public Health EOC.
- In accordance with the existing regulation and the EOC Operation Manual, the KCDC has established 10 RRTs consisting of KCDC public officers and healthcare workers from the private sector. The KCDC has trained the RRTs and EOC staff to build their emergency response capability and capacity.
- The RRTs have been trained on specific priority diseases. However, they are also flexible and can rapidly respond to other types of public health emergencies.

Areas that need strengthening/ challenges

- To operate the EOC 24/7, the KCDC maintains a three-shift system with 11 EOC staff members. However, the EOC staff are contracted employees who face limitations in their roles and responsibilities compared to government officers. Currently, this is addressed by having EIOs as 24/7 on-call duty officers. Moving forward, it may be necessary to ensure that all EOC staff have permanent employment status.

R.2.2 EOC operating procedures and plans – Score 4

Strengths/ best practices

- EOC operations are defined and based on the Regulation on EOC Operations and the EOC operation manual.
- The EOC currently receives information from a diverse range of communication channels including dedicated telephone reporting lines, web reporting systems, and messaging systems. Systems are also in place for information sharing and coordination with other sectors.
- The multisectoral coordination system has been tested with relevant ministries/agencies during the SARS epidemic in 2003, the H1N1 influenza pandemic in 2009, and the MERS outbreak in 2015.
- A multisectoral IMS system is also in place for multi-hazard events, in which the KCDC provides public health support to the MoIS.

Areas that need strengthening/ challenges

- The KCDC may need to develop a methodology to determine the resources required to operate the EOC at the different levels of activation and for various types of public health emergencies.
- Since government officers are circulated every two to three years, the EOC needs to continue its current practice in regularly updating the contact list of personnel.

R.2.3 Emergency operations programme – Score 5

Strengths/ best practices

- The public health EOC has been activated rapidly in less than 120 minutes on more than one occasion.
- The KCDC has experience in the activation and operation of the EOC during infectious disease outbreaks, as well as mass gatherings.
- The KCDC regularly participates in multisectoral exercises and conducts exercises to test the activation of the public health EOC.

Areas that need strengthening/ challenges

- It is necessary to continually update the manuals and guidelines through after-action reviews and analysis of lessons learned following EOC activation.
- In addition to the current training provided, module-based training for specific scenarios may also need to be developed.

R.2.4 Case management procedures implemented for IHR relevant hazards – Score 4

Strengths/ best practices

- Guidelines are in place for the case management of each infectious disease that may cause public health emergencies, as well as other IHR-relevant hazards.
- Procedures and available resources for infectious disease emergency response are well described in the emergency management plan established by each local government.

Areas that need strengthening/ challenges

- Procedures may need to be developed to allow for expedited supplementation or revision of existing manuals and SOPs when they are insufficient to respond to "new" public health events.

Linking Public Health and Security Authorities

Introduction

Public health emergencies pose special challenges for law enforcement, whether the threat is manmade (e.g. the anthrax terrorist attacks) or naturally occurring (e.g. flu pandemics). In a public health emergency, law enforcement will need to quickly coordinate its response with public health and medical officials.

Target

Country conducts a rapid, multisectoral response in case of a biological event of suspected or confirmed deliberate origin, including the capacity to link public health and law enforcement, and to provide and/or request effective and timely international assistance, such as to investigate alleged use events.

Republic of Korea level of capabilities

With the increasing global terrorism threats, the ROK has established a comprehensive bioterrorism plan and conducted regular training and joint-exercises to ensure a multisectoral response in the event of a bioterrorist attack. This coordination mechanism between the public health sector and security authorities may also be applicable for non-terrorism events.

The ROK has developed the Plan for Bioterrorism Preparedness and Response since 2001 and published the Guideline for Bioterrorism Preparedness and Response since 2002, both of which are updated regularly. In 2016, the MOHW also established the Infectious Disease Emergency Management Plan which includes response to a large-scale public health emergency caused by an infectious disease, including bioterrorism. An MOU is in place between the KCDC and the Ministry of National Defence since 2014 to ensure a rapid and effective response to biological warfare and bioterrorism events, including receiving military support if required.

The Counterterrorism Center has been established to collect and evaluate information on all terrorism threats, with inputs from different sectors including the KCDC. The Director of Counterterrorism Center has been assigned as the central command to trigger the bioterrorism emergency alert level and coordinate multisectoral collaboration during an event. To support the rapid identification of causative pathogens during a public health event or emergency, a well-developed laboratory response network working closely with law enforcement also exists which can then trigger appropriate and timely public health response.

Recommendations for priority actions

- Continue to strengthen the linkage between public health and security authorities and consider developing scenario-based response contingency plans, including multisectoral collaboration to develop risk communication messages.

Indicators and scores

R.3.1 Public health and security authorities (e.g. law enforcement, border control, customs) linked during a suspect or confirmed biological event – Score 5

Strengths/ best practices

- The ROK has a comprehensive bioterrorism plan and guidelines in place which are regularly updated and operate under the various laws such as the Infectious Disease Control and Prevention Act, Act on Anti-terrorism for the Protection of Citizens and Public Safety, and the Quarantine Act.
- The ROK has established regular information sharing and coordination mechanisms between the public health and security sectors.
- The ROK conducts multisectoral exercises annually among relevant ministries to develop response capacity and ensure multisectoral coordination to prepare for bioterrorism events.

Areas that need strengthening/ challenges

- There may be a need for a more detailed countermeasure system, training, and simulation exercises for different scenarios to better prepare for a large-scale public health emergency which requires a multisectoral response involving the security authorities.

Medical countermeasures and personnel deployment

Introduction

Medical countermeasures are vital to national security and protect nations from potentially catastrophic infectious disease threats. Investments in medical countermeasures create opportunities to improve overall public health. In addition, it is important to have trained personnel who can be deployed in case of a public health emergency for response.

Target

National framework for transferring (sending and receiving) medical countermeasures, and public health and medical personnel from international partners during public health emergencies.

Republic of Korea level of capabilities

The ROK has systems in place to stockpile and distribute medical countermeasures in the event of a public health emergency. These systems also have a legal basis as stipulated in the Infectious Disease Control and Prevention Act and Pharmaceutical Affairs Act. The ROK has identified 11 priority infectious diseases that have the potential to cause a public health emergency based on their high mortality rate and risk of transmission. Guidelines have been developed to guide the stockpiling, management, storage and distribution of medication and other medical supplies including personal protective equipment (PPE) for these 11 priority diseases. Similarly, the ROK has also established systems for other types of public health emergencies such as the stockpiling of prophylactic and decorporation agents for radiation emergencies.

Dispatch of medical supplies and workforce during international public health emergencies is possible through the Overseas Emergency Relief Act. Under this Act, the ROK has provided medication and deployed the KDRT following public health emergencies such as typhoon Haiyan in the Philippines in 2013, the earthquake in Nepal in 2015, and the Ebola epidemic in West Africa. In addition, the ROK continuously evaluates and revises their emergency relief plans and policies to enable rapid dispatch of workforce and medical countermeasures through various exercises. The ROK also works with international organizations to improve the effectiveness and transparency of emergency relief and to align with international standards.

Recommendations for priority actions

- Develop an approach with regional partners to jointly share and mobilize stockpiles of medical countermeasures during public health emergencies.
- Develop a comprehensive manual for those being trained and considered for international deployments. The manual may include elements to consider prior to, during, and after returning from deployment.
- Consider reviewing the current position and consider establishing a system of receiving international health personnel.

Indicators and scores

R.4.1 System in place for sending and receiving medical countermeasures during a public health emergency – Score 4

Strengths/ best practices

- In compliance with the Infectious Disease Control and Prevention Act, the ROK has stockpiled essential medical countermeasures, including antivirals and PPE that can be rapidly distributed in the event of an infectious disease outbreak or other public health emergency.
- The five-year Strategic National Stockpile, which is currently being developed, will further enable more efficient management of national stockpiles.
- The ROK has legislation in place to grant rapid approval and introduction of the necessary medication in the event of an infectious disease outbreak.
- The ROK has a well-developed and recently activated aid system in place to dispatch relief supplies for overseas emergency relief.

Areas that need strengthening/ challenges

- A system is needed to manage national stockpiles on a real-time basis. Development of this system is in progress and will be implemented by the end of 2017.
- An approach for sharing and mobilizing stockpiles of medical countermeasures during public health emergencies will need to be developed with regional partners.

R.4.2 System in place for sending and receiving health personnel during a public health emergency – Score 3

Strengths/ best practices

- In the ROK, the Overseas Emergency Relief Act is in place to provide medical assistance to other countries for disasters and other international public health emergencies.
- Even though there were no deployments in the previous year, the ROK has experience in providing emergency relief during disasters in other countries, as well as responding to infectious disease outbreaks such as the Ebola epidemic in West Africa in 2014/5.
- The ROK has received public health teams during the MERS outbreak in 2015 and formed the ROK-WHO MERS joint mission which provided recommendations based on the joint-assessment.

Areas that need strengthening/ challenges

- There is currently no system in place in the ROK for receiving international medical personnel assistance during public health emergencies.
- There is a need to develop systematic procedures for workforce deployment in response to infectious disease outbreaks outside the ROK including considerations for effective training programmes, a sufficient budget, and personal safety and security. The response to the Ebola epidemic in West Africa was the first disease outbreak response conducted by the KDRT, which was conducted through the GOARN.

Risk communication

Introduction

Risk communications should be a multilevel and multifaceted process which aims at helping stakeholders define risks, identify hazards, assess vulnerabilities and promote community resilience, thereby promoting the capacity to cope with an unfolding public health emergency. An essential part of risk communication is the dissemination of information to the public about health risks and events, such as disease outbreaks. For any communication about risk caused by a specific event to be effective, the social, religious, cultural, political and economic aspects associated with the event should be taken into account, including the voice of the affected population.

Communications of this kind promote the establishment of appropriate prevention and control action through community-based interventions at individual, family and community levels. Disseminating the information through appropriate channels is essential. Communication partners and stakeholders in the country need to be identified, and functional coordination and communication mechanisms should be established. In addition, the timely release of information and transparency in decision-making are essential for building trust between authorities, populations and partners. Emergency communications plans should be tested and updated as needed.

Target

State Parties use multilevel and multifaceted risk communication capacity. Real-time exchange of information, advice and opinions between experts and officials or people who face a threat or hazard (health or economic or social wellbeing) to their survival, so that informed decisions can be made to mitigate the effects of the threat or hazard and protective and preventive action can be taken. This includes a mix of communication and engagement strategies, such as media and social media communications, mass awareness campaigns, health promotion, social mobilization, stakeholder engagement and community engagement.

Republic of Korea level of capabilities

The ROK has a robust risk communication management system for infectious diseases and public health emergencies. Following the experience in the MERS outbreak in 2015, the Office of Communication in KCDC was established in January 2016, with the necessary workforce, budget and guidelines for rapid, accurate and transparent communication.

The Office of Communication has developed SOPs and guidelines that outline the risk communication system and strategy, basic principles, communication networks, and evaluation mechanisms. There are a variety of communication channels used such as media, web-based platforms, social networks, and the KCDC Call Center (1339) that operates 24/7. In particular, KCDC has optimized social networks and mobile phones to increase accessibility and user-friendliness of communication, although considerations need to be made to improve access in languages other than Korean.

There is a mechanism in place to promptly identify and manage rumours and misinformation through social networks and the call center, and this is coordinated with relevant ministries and communities. Following the MERS outbreak in 2015, the Infectious Disease Control and Prevention Act was updated to include a legal basis for information disclosure for timely, accurate and transparent information in times of disease emergencies.

The Office of Communication conducts regular spokespersons' meetings with other partners and stakeholders, and this mechanism could be scaled up to enhance coordination. Procedures and regular exercises for communication coordination from the national to the local levels, and with partners and stakeholders need to be developed to identify gaps and to update the procedures accordingly.

Taking into consideration that community engagement and social mobilization are as important in emergency response operations, it is critical to establish mechanisms to integrate risk communication into risk assessment and rapid response operations.

Recommendations for priority actions

- Enhance the functionality of a coherent risk communication system by developing and testing operational arrangements and guidelines for managing communication for all hazards across Ministries, at the national and local levels, and with other partners and stakeholders.
- Integrate risk communication and community engagement into risk assessment procedures and rapid response operations.
- Further improve timely, accurate and transparent public communication and efficient rumour management by enhancing implementation of information disclosure during public health emergencies.
- Address the communication needs of all audiences, including developing content in other languages.
- Continue to train core staff of the Office of Communication in KCDC and in other ministries to bolster various risk communication capacities beyond media and public communication.

Indicators and scores

R.5.1 Risk communication systems (plans, mechanisms, etc.) – Score 4

Strengths/ best practices

- Following the MERS outbreak in 2015 and the reform of the National Disease Control system, the Office of Communication in KCDC was established with a trained workforce, budget, guidelines, and procedures to manage risk communication during public health emergencies.
- There is a mechanism in place for rapid, accurate and transparent communication using various channels such as the media, web-based platforms, social networks, and the 24-hour KCDC Call Center (1339).
- The revised Infectious Disease Control and Prevention Act facilitates timely information disclosure that enhances rumour management in times of disease emergencies.

Areas that need strengthening/ challenges

- Risk communication is yet to be integrated into risk assessment and emergency response operations. This entails developing a trained workforce that can be deployed during emergencies as part of the RRTs.
- Implementation of information disclosure needs to be enhanced both for timely communication, efficient rumour management and as a major component of disease control and prevention.
- Training and exercises are needed for effective coordination from the central to the local levels, with partners and stakeholders including those in the private sector to help improve communication skills.

R.5.2 Internal and partner communication and coordination – Score 3

Strengths/ best practices

- Key ministries and agencies including KCDC have a designated spokesperson system that holds weekly meetings or ad-hoc meetings if necessary.
- There is some ad-hoc arrangement to coordinate with other agencies to share relevant information and press releases.

Areas that need strengthening/ challenges

- The mechanism for communication from central to local governments needs to be fully operational with agreed procedures and clearance arrangements.
- Coordination arrangements among partners need to be developed and tested in exercises or real-life events to identify gaps and to update the guidelines accordingly.

R.5.3 Public communication – Score 4

Strengths/ best practices

- The KCDC has a state-of-the-art system for public communication that maximizes multiple platforms such as the media, social networks, the 24-hour KCDC Call Center (1339) and 1:1 text messaging that facilitates rapid and targeted communication.
- The KCDC runs the Citizens' Communication Supporters and Experts' Communication Advisory to encourage the general public and stakeholders, respectively, to participate and engage in risk communication.

Areas that need strengthening/ challenges

- Considerable work needs to be made in rebuilding and maintaining trust following the MERS outbreak in 2015 to make health agencies the reliable and trusted source of information again. This is important to help citizens make informed decisions and create positive behavioural changes.
- Information access needs to be improved especially for non-Koreans and the international community by making available content in other languages.

R.5.4 Communication engagement with affected communities – Score 3

Strengths/ best practices

- The KCDC has rapid risk communication mechanisms for public health events that include community engagement and social mobilization, which are included in the SOP for Risk Communication for Public Health Emergencies.
- There is an ad-hoc arrangement to communicate from the central to local levels and to provide affected communities with precautionary measures to prevent disease spread, as demonstrated during the water-borne Cryptosporidiosis outbreak in 2013.
- During the MERS outbreak in 2015, the KCDC provided preventive messages and precautionary measures to the population at risk.

Areas that need strengthening/ challenges

- Currently, the ROK does not have a system to dispatch a risk communicator as part of an outbreak response team. Taking into consideration that social mobilization and community engagement are critical functions in preparedness and response operations, it is necessary to build this capacity and establish such a system.

R.5.5 Dynamic listening and rumour management – Score 4

Strengths/ best practices

- The ROK has enhanced its capacity to rapidly communicate with the public to manage anxieties that can result from misinformation. This was evident when the first imported case of Zika virus infection was laboratory-confirmed in the ROK in March 2016. The KCDC immediately provided the public with accurate and easy-to-understand information, which was disseminated using various materials such as a visualized leaflet, videos, and card-news to dispel rumours regarding Zika virus infection and its mode of transmission.

Areas that need strengthening/ challenges

- Detailed procedures and mechanisms for monitoring, fact-checking, responding to rumours and misinformation need to be established to raise the awareness and readiness of the general public.

OTHER IHR-RELATED HAZARDS AND POINTS OF ENTRY

Points of entry

Introduction

All core capacities and potential hazards apply to "points of entry" and thus enable the effective application of health measures to prevent international spread of diseases. States Parties are required to maintain core capacities at designated international airports and ports (and where justified for public health reasons, a State Party may designate ground crossings), which will implement specific public health measures required to manage a variety of public health risks.

Target

States Parties designate and maintain core capacities at international airports and ports (and where justified for public health reasons, a State Party may designate ground crossings) that implement specific public health measures required to manage a variety of public health risks.

Republic of Korea level of capabilities

The ROK has an extensive history of legislation to prevent the importation of infectious diseases at PoEs dating back to 1954 when the Quarantine Act to Seaport and Airports was first enacted. Since then, this Act has been amended 20 times and is currently implemented as the Quarantine Act since 2016. The KCDC is the agency responsible for screening passengers entering the country for possible signs and symptoms of infectious diseases. The Act on the Prevention of Contagious Animal Diseases and Plant Protection Act also gives authority to the APQA under the MAFRA to screen incoming animals, plants, and livestock products for infectious diseases.

To fulfill its responsibilities under the IHR (2005), the KCDC has 13 quarantine stations and 11 quarantine branch offices situated at airports and seaports nationwide to screen incoming persons. The ROK has comprehensive systems and measures that are implemented in accordance with the KCDC's quarantine and response guidelines which are regularly updated. These include: screening incoming persons at different levels by their flight of origin through thermal scanners and a health questionnaire; a system in place for transferring symptomatic suspected cases to designated hospitals with isolation units; isolation facilities at PoEs for close contacts of symptomatic cases while they await test results; BSL 2 or 3 laboratory facilities at all PoEs for rapid diagnosis; and tracking location of travellers through telecommunication companies during an outbreak. There is also a mandated requirement for all international conveyances (aircraft and ships) to report ill passengers on board to KCDC prior to arrival at the PoEs. For vector control, vector and reservoir control programmes are also in place in and near PoEs, with disinfection of conveyances or facilities able to be carried out under the instruction of the Director of the quarantine station.

For effective public health response at PoEs, the KCDC has established a comprehensive response plan to prepare for and respond to public health emergencies in collaboration with other ministries/agencies. The KCDC conducts regular meetings with the APQA and the Ministry of Justice and the Customs Service through the Quarantine, Immigration and Customs (QIC) institutional council; joint exercises at the quarantine stations with Immigration and Customs and public health centers; and annual evaluation of the National Quarantine Station.

In light of the ever-increasing mobility of the global population and the movement of existing or emerging infectious diseases with the travelling public, many nations are now contemplating the creation or modification of quarantine laws to accommodate these changes. International travel time is now shorter than the incubation period of most infectious disease threats so travellers may remain asymptomatic when they enter the country. As a result, detection of ill persons at PoEs may no longer be a particularly effective response to the international movement of infectious diseases in a highly-connected world. Over time, the ROK may wish to consider a paradigm shift from an emphasis on measures to stop infectious diseases at the PoEs and to also explore other public health measures to mitigate diseases.

Recommendations for priority actions

- Consider a paradigm shift from an emphasis on measures to stop infectious diseases at PoEs to explore other public health measures to limit the impact and spread of imported infectious diseases. Specifically, the ROK may consider the following four public health measures:
  - Ensure that all hospitals have comprehensive hospital infection control measures in place and that medical staff are trained to ask for overseas travel history from all ill patients and their families in the emergency room. This is in recognition that the "point of entry" of infectious diseases is no longer at the border (airport or seaport), but rather "at the door" of the local hospital where the travellers who become ill after arrival will seek medical care.
  - Ensure that travellers have access to pre-travel health information, vaccinations and necessary medications (e.g., malaria prophylaxis). To some extent, this is being met by current services such as the KCDC Call Centre (1339).
  - Ensure that travellers have access to post-travel information on what to do and whom to call if they become ill after returning from their trip. To some extent, this is being met by current services.
  - Maintain trained quarantine officials at major POEs to respond and assess ill persons on board reported by the captains of vessels. Ensure that there are rapid transportation systems to designated hospitals if hospitalization is warranted and that there is sufficient information to identify and locate possible contacts of ill persons.
- Consider conducting cost-effectiveness studies of the current border health measures and quarantine system at PoEs to evaluate the extensive system developed in the ROK under the revised Quarantine Act. This would also provide valuable information for other nations that are contemplating creating similar systems of their own.

Indicators and scores

PoE.1 Routine capacities established at points of entry – Score 5

Strengths/ best practices

- The KCDC has continually revised and expanded the long-standing Quarantine Act, which provided the legal basis to implement a comprehensive quarantine system to detect and isolate travellers who might introduce infectious disease threats.
- Quarantine stations are resourced with permanent trained quarantine officials, guidelines, procedures, response plans, and systems for information linkages to other relevant Ministries. These all constitute the basic installations for implementing the Quarantine Act and in compliance with the IHR (2005).
- The KCDC Call Center (1339) is open 24 hours a day, seven days a week to provide travel health advice to both departing and incoming passengers. This advice is available over the phone or via a real-time text chat service. The center also operates an information booth at Incheon airport.

Areas that need strengthening/ challenges

- Procedures for disembarkation of ill passengers on aircraft are currently managed on a case-by-case basis. Standard SOPs should be developed to ensure the safe removal of ill passengers from the arriving conveyance.

PoE.2 Effective public health response at points of entry – Score 5

Strengths/ best practices

- After the National Quarantine Station was reorganized as an affiliated organization of the KCDC in 2004, it has improved its capacity to detect and collect information on outbreaks and to screen incoming passengers for infectious diseases. Following the MERS outbreak in 2015, the ROK has also upgraded the laboratory and isolation facilities at PoEs.
- The National Quarantine Station is currently operating automated quarantine checkpoints equipped with thermal scanners. An electronic system is also in place to store passport information and data from the health questionnaires to enable automatic generation of a list of individuals who had contact with suspected cases. Currently, these checkpoints are being operated for travellers arriving from MERS affected areas in the Middle East.
- An integrated IT system is also available to send text messages to those arriving from countries where high-risk disease outbreaks are occurring. The travel history of patients visiting medical institutions can also be accessed through this system.
- The KCDC conducts an evaluation of 13 National Quarantine Stations at the end of every year and enhances their capacities based on feedback from internal and external experts.
- The KCDC has held the first meeting of the experts' committee for the revision of the evaluation indicators of the national quarantine stations, where a plan has been formulated for the development of indicators for various tasks at airports, seaports, and quarantine stations nationwide.

Areas that need strengthening/ challenges

- Although the KCDC uses health questionnaires and fever screening to identify suspected patients who arrive directly from affected areas, it is difficult to capture incoming passengers who have stopped over in non-affected areas. To address this, KCDC has established a system that integrates the telecommunication and the quarantine information systems. However, this is limited to Korean citizens only.
- Although the KCDC shares information of travellers who have visited an affected area with medical institutions during the incubation period, healthcare workers can only access the overseas travel history of patients when the patients are prescribed medication.
- KCDC operates a vector control programme which includes the trapping of mosquitos around PoEs to screen for exotic species. However, these sampling points are currently positioned 200 meters from the unloading zone instead of the 400 meters minimum requirement as per IHR (2005) recommendation, based on the flight range of the Aedes aegypti mosquito.

Chemical events

Introduction

Timely detection and effective response of potential chemical risks and/or events require collaboration with other sectors responsible for chemical safety, industries, transportation and safe disposal. This would entail that State Parties need to have surveillance and response capacity to manage chemical risk or events and effective communication and collaboration among the sectors responsible for safety.

Target

States Parties with surveillance and response capacity for chemical risks or events. This requires effective communication and collaboration among the sectors responsible for chemical safety, industries, transportation and safe disposal.

Republic of Korea level of capabilities

Since 1963, the ROK has had legislation in place to regulate substances with acute toxicity. In 1996, this legislative base was updated to comply with the Organization for Economic Co-operation and Development (OECD) Chemical Substance Management Regulations.

Since 2007, the ROK has designated 14 environmental health centers to investigate and perform research on specialized areas, such as oil spill pollution, respiratory diseases, heavy metal exposure, hazardous gas and chemical exposure. Based on Article 14 of the Environmental Health Act, the Korean National Environmental Health Survey has also been conducted on a three-year cycle to measure the exposure levels to various environmental hazards in the population.

From 2013 onwards, a chemical accident prevention and response policy was designated as a government project, which introduced a series of measures including off-site risk assessment, a risk management plan, permission for business, and an on-scene coordinator system. The Act on Registration and Evaluation of Chemical Substances, whose role is similar to that of the regulation concerning the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) in the European Union, currently regulates the reporting, registration, and evaluation system for chemical substances. Under this Act, all existing chemicals (approximately 7,000) placed on the market in amounts of over 1 ton per year must be registered by 2030 according to their risk levels.

In addition, in 2014, the National Institute of Chemical Safety was established. This institute is dedicated to the support, research, evaluation, and education in preparation for chemical accidents and terrorism. A Joint Inter-Agency Chemical Emergency Preparedness Center was also established within six industrial complexes in cooperation with relevant ministries, such as the MoE, the Ministry of Trade, Industry, and Energy, and the Ministry of Employment and Labor, to ensure effective responses to chemical accidents.

Recommendations for priority actions

- Establish a national poison control center in accordance with the recommendations of the International Programme on Chemical Safety, building upon the existing toxicity research programmes at the NIER, the National Institute of Food and Drug Safety Evaluation, and the National Academy of Agricultural Science.
- Expand the national public health exercise programme to include exercises that test the health system's readiness to execute its responsibilities in a chemical response.

- Establish an integrated chemical management system for consumer products.
- Consider aggregating existing chemical monitoring activities into an integrated national chemical surveillance system to provide a real-time common operating picture of chemical threats and exposures to all relevant stakeholders.

Indicators and scores

CE.1 Mechanisms established and functioning for detecting and responding to chemical events or emergencies – Score 4

Strengths/ best practices

- A number of specific guidelines and manuals exist for the management of chemical events.
- A number of sectoral chemical monitoring programmes are in place, including the monitoring conducted by the National Institute of Chemical Safety and the six Joint Inter-Agency Chemical Emergency Preparedness Centers.
- A sentinel health monitoring programme assesses exposure levels of humans to environmental hazards every three years.
- A national Chemical Accident Response Information System exists, which provides information on chemical properties, dangers, and response methods; an application for mobile phones also provides first responders chemical information on-site and allows information sharing with the EOC.

Areas that need strengthening/ challenges

- There is no dedicated poison control center in the ROK.
- The current three-year cycle of sentinel monitoring may not be frequent enough to provide significant early warning of environmental exposures.
- No rapid toxic screening methods are currently used, delaying the detection and characterization of deliberate exposures.

CE.2 Enabling environment in place for management of chemical events – Score 5

Strengths/ best practices

- A number of laws have been enacted over the last 50 years to regulate chemicals, their safe management, and response to chemical accidents.
- The ROK maintains a hazardous substances registration mechanism and an inventory of major chemical sites across the country.
- To strengthen the voluntary safety management of the private sector, the ROK operates a consulting system for small- and medium-sized businesses with relatively low capacity.
- A system has been introduced to disclose information on the handling of chemicals gathered through the chemical statistics survey.
- Emergency response manuals identify roles and responsibilities for response activities, as well as mechanisms for intersectoral information sharing and collaboration.
- The Chemical Safety Agency conducts chemical safety drills within the jurisdiction of six Joint Inter-Agency Chemical Emergency Preparedness Centers to test their readiness to respond and to update manuals based on the exercise findings.

Areas that need strengthening/ challenges

- The Chemical Response Plans from the MoE are not integrated with the national public health emergency response planning framework.
- The national public health exercise programme currently does not include chemical event exercises to test the operational readiness of the health system to execute its responsibilities.
- Multisectoral coordination mechanisms do not include PoEs in chemical safety, monitoring, and response activities.

Radiation emergencies

Introduction

To counter radiological and nuclear emergencies, timely detection and an effective response towards potential radiological and nuclear hazards/events/emergencies are required in collaboration with sectors responsible for radiation emergency management.

Target

States Parties with surveillance and response capacity for radiological and nuclear hazards/events/emergencies. This requires effective communication and collaboration among the sectors responsible for radiological and nuclear emergency management.

Republic of Korea level of capabilities

The ROK has 25 nuclear power plants and many industrial and medical radiation sources. Neighbouring countries likewise are a source of potential radiation emergencies. Japan witnessed nuclear power plant accidents at Fukushima in 2011, and China has 88 nuclear power plants under operation, construction, and planning.

Given this environment, the Korean government maintains excellent capabilities to respond to radiation emergencies. The legislative basis for these capacities is strong. The Nuclear Safety Act was enacted to separate regulation from promotion. The Act on Safety Control of Radioactive Rays around Living Environments was enacted to protect people from natural radiation. As for a radiation emergency response, the Act on Physical Protection and Radiological Emergency was enacted to define both emergency response measures and post-disaster recovery activities in the event of a radiation emergency.

The organizational and systems resources for radiation emergencies are also robust. The Fukushima Nuclear Power Plant accident in 2011 led to the establishment of the NSSC, an independent government agency for the management of nuclear/radiological emergencies with an independent budget. The Nuclear Safety Comprehensive Plan and the National Radiation Emergency Preparedness Plan, are national strategic plans required by law and revised each year. The central and local governments and civil emergency organizations in charge of responding to radiation emergencies are all mandated to follow these plans.

Recommendations for priority actions

- Develop a regional nuclear/radiological information sharing and response strategy with neighbouring countries.
- Continue to investigate and strengthen the capacities of nuclear facilities for resilience to seismic and other natural disaster threats.
- Continue to strengthen community engagement and risk communications activities regarding radiation emergencies.
- Expand the national qualified health physics and radiobiology workforce through the national workforce strategy.

Indicators and scores

RE.1 Mechanisms established and functioning for detecting and responding to radiological and nuclear emergencies – Score 5

Strengths/ best practices

- Laws, policies, plans, and procedures for detection, assessment, and response to radiation emergencies are well established in the ROK. The Act on Physical Protection and Radiological Emergency has been the basis for preparedness activities at all nuclear facilities. There is an Off-site Emergency Management Center (OEMC) at each nuclear facility. The ROK has also established specialized agencies, such as Korea Institute of Nuclear Safety (KINS), National Radiation Emergency Medical Center (NREMC) and Korea Radiation Safety Foundation (KorSafe) to address technical matters related to radiation emergency responses.
- The Center for Environmental Radiation and Radioactivity Assessment (CERA) of KINS has been re-designated as the world's first International Atomic Energy Agency (IAEA) Collaborating Center on environmental radioactivity measurement in 2016. The CERA also has served as a hub laboratory of the IAEA Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) Network for the Asia-Pacific region since 2011.
- The ROK government is thoroughly monitoring both human-made and natural radiation levels as required by law through a multisectoral approach. These include periodic analysis of environmental samples at the 15 Regional Radiation Monitoring Stations (RRMS); monitoring of real-time ambient gamma dose rates at 160 Environmental Radiation Monitoring Stations (ERMS); radiation surveillance on imported cargos at major airports and ports in ROK; remote detection of changes at nuclear facilities through the Atomic Computerized Technical Advisory System for a Radiological Emergency (AtomCARE); and monitoring of consumer products by a number of agencies for agricultural, livestock, fisheries, processed food products, rivers and streams.
- The ROK utilizes advanced technologies for early warning of radiological threats. The unmanned, real-time, underwater radiation monitoring system has been established along the coastal sea of the ROK for early detection of any leakage of radiation material into the ocean. In addition, the prediction range of the Accident Dose Assessment (ADAMO) system which predicts the effects of radiation emergencies, is gradually being extended from East Asia to all over the world.
- The ROK, China, and Japan jointly conduct emergency preparedness and response drills for radiological threats and regularly hold the Top Regulators' Meeting (TRM).
- During emergencies, environmental radiation detection is conducted by the Joint Radiological Emergency Monitoring Center in each OEMC.
- An emergency medical care system has been established to respond to large numbers of patients exposed to radiation. These include the identification of 24 radiological emergency medical facilities, and stockpiling of prophylactic and decorporation agents which can be distributed by local governments when needed.

Areas that need strengthening/ challenges

- Recently, the threat from the increase of nuclear power plants in neighbouring countries is rising. The public is increasingly concerned about this possibility, and they are demanding the development of a countermeasure strategy.
- The current staffing of radiation-relevant agencies in the ROK is below the Organization for Economic Co-operation and Development (OECD) average.

RE.2 Enabling environment in place for management of radiation emergencies – Score 5

Strengths/ best practices

- A robust hierarchy of radiation emergency response plans and manuals exists. These include the Nuclear Safety Comprehensive Plan and the National Radiation Emergency Preparedness Plan at the national level; Regional Radiation Emergency Preparedness Plans at the municipalities; detailed emergency management manuals for each organization; and Radiation Emergency Plans at individual nuclear facilities. The Standard Manual for Crisis Management in the Area of Nuclear Safety in particular Radiation Leakage also specifies the pan-governmental emergency management system.
- Drills to ensure response capacity is adequate to cope with radiological disasters are conducted more than 170 times a year by multiple levels of the government, different agencies, municipalities, military, police, and the community; these drills are also used to refine response manuals as needed.
- An annual Train-the-Trainers programme and refresher training are offered for police and firefighters to strengthen the response capacity in the initial phase of an emergency.
- The Ubiquitous-Regional Radiation Emergency Support Team (U-REST), which is composed of 200 civilian radiation specialists from 15 regions across the ROK, has been established since 2007 to offer rapid technical support in the event of a radiation emergency to police, firefighters, and other initial emergency responders until KINS experts arrive at the site.
- The ROK has established a radiation analysis network among government agencies that can share analytical techniques and exchange technologies for quality standardization, and conduct rapid and efficient joint radiation analysis in the event of a radiation emergency. This network includes the NSSC, the MFDS, the Ministry of Oceans and Fisheries, the MoE, and national research institute.
- In the event of a disaster caused by radiation, there are also laws in place to provide financial assistance for the recovery and relief of disaster-stricken areas.

Areas that need strengthening/ challenges

- The seismic resilience of nuclear facilities is of increasing public concern, as is the effectiveness of the radiological emergency response system.

Appendix 1: JEE background

Mission place and dates

Osong-eup, Republic of Korea: 27 August – 1 September, 2017

Incheon, Republic of Korea: 28 August, 2017

Kwangmyeong, Republic of Korea: 28 August, 2017

Sejong, Republic of Korea: 28 August, 2017

Seoul, Republic of Korea: 28 August, 2017

Mission team members:

- Dr. Ronald St. John, Canada, Public Health Agency of Canada *(team leader)*
- Dr. Li Ailan, WHO Regional Office for the Western Pacific
- Dr. Carolyn Benigno, Food and Agriculture Organization of the UN
- Ms. Joy Rivaca Caminade, WHO Regional Office for the Western Pacific
- Dr. Cindy Chiu, Japan, Tohoku University
- Dr. Jeffery Cutter, Singapore, Ministry of Health
- Mr. Peter Rzeszotarski, United States of America, US Centers for Disease Control and Prevention
- Dr. Tomoya Saito, Japan, National Institute of Public Health
- Prof. Mika Salminen, Finland, Finnish National Institute for Health and Welfare
- Dr. Mark Salter, England, Public Health England
- Dr. Maria Van Kerkhove, WHO Headquarters
- Mr. Joel Willis, Australia, Australia Department of Health
- Dr. Zhen Xu, China, Chinese Center for Disease Control and Prevention

Objective

To assess the Republic of Korea's capacities and capabilities relevant to the 19 technical areas of the JEE tool for providing baseline data to support Republic of Korea's efforts to reform and improve their public health security.

The JEE process

The JEE process is a peer-to-peer review. The entire external evaluation, including discussions around the scores, the strengths, the areas that need strengthening, best practices, challenges and the priority actions should be collaborative, with JEE team members and host country experts seeking full agreement on all aspects of the final report findings and recommendations. Should there be significant and irreconcilable disagreement between the external team members and the host country experts, or among the external, or among the host country experts, the JEE team lead will decide the outcome; this will be noted in the final report along with the justification for each party's position.

Preparation and implementation of the mission

The Republic of Korea voluntarily requested a JEE as part of their commitment to achieving IHR (2005) core capacities. The KCDC established the JEE Task Force to prepare for the JEE, and the first workshop with representatives from related ministries took place on January 17, 2017. The JEE Task Force organized three working-level review meetings and two workshops for drawing up the JEE self-evaluation report. The compilation of self-evaluation report of the 19 technical areas has taken approximately six months.

The JEE Task Force has held seven video conferences with WHO Regional Office for the Western Pacific on a monthly basis since February 2017 to discuss the JEE preparation, and to check the progress of the self-evaluation report. The self-evaluation report and supporting documentation were shared with the JEE team prior to the mission. A teleconference was also held with the international team members of the JEE team on 10 August 2017 to discuss objectives, clarify roles and responsibilities, and examine the process and logistics during the JEE mission.

The mission began on 27 August 2017 with a briefing between KCDC and international experts of the JEE team. Between 28 August and 31 August 2017, national and international experts jointly reviewed national capacities in the 19 technical areas of the JEE tool. Field visits were also conducted on 29 August 2017 and provided an opportunity for more in-depth discussions and verification of capacities. Field sites included the EOC, National Laboratory for Viral Diseases, Seoul Research Institute of Health and Environment, Quarantine Station at Incheon International Airport, KCDC Call Center (1339), National Disaster and Safety Status Control Center & Central Disaster and Safety Countermeasures Headquarters, and a city level public health center. The mission concluded with a joint review and consensus of JEE scores.

The results of the assessment and observations of the Republic of Korea's preparedness were presented to the Minister of Health and Welfare, Honourable Professor Neunghoo Park in Sejong, the Republic of Korea on 1 September 2017.

Limitations and assumptions

- The evaluation was limited to one week, which limited the amount and depth of information that could be managed.
- It is assumed that the results of this evaluation will be publically available.
- The evaluation is not just an audit. Information provided by the Republic of Korea will not be independently verified but will be discussed and the evaluation rating mutually agreed to by the Republic of Korea and the evaluation team. This is a peer-to-peer review.

Key Republic of Korea participants and institutions

Republic of Korea lead representatives:

- Dr. Eunkyeong Jeong, Director, Korea Centers for Disease Control and Prevention (KCDC)
- Dr. Youngmee Jee, Director General, Center for Infectious Disease Research, KCDC *(JEE National Team Lead)*
- Dr. Minkyu Kang, Division Director, Division of Disease Policy, MOHW
- Dr. Kyungwon Hwang, Deputy Director, Division of Disease Policy, MOHW
- Dr. Samgi Son, Senior Deputy Director, Chemical Policy Division, MoE
- Dr. Chungah Cho, Division Director, Radiation Safety Division

- Dr. En-Hi Cho, Division Director, Division of Infectious Disease Control, KCDC
- Dr. Cheon-Kwon Yoo, Division Director, Division of Laboratory Diagnosis Management, KCDC
- Dr. Kisoo Park, Division Director, Office of Communication, KCDC
- Dr. Ok Park, Division Director, Division of Risk Assessment and International Cooperation, KCDC
- Dr. HyungJoo Yoon, Director General, Food Safety Policy Bureau, MFDS
- Dr. Sangbae Han, Director, Food Safety Policy Division of Food Safety Policy Bureau, MFDS
- Dr. Ju Sim Kim, Division Director, Division of Bioterrorism Preparedness and Response, KCDC
- Dr. Insik Kong, Division Director, Division of Vaccine-Preventable Diseases Control and National Immunization Programme, KCDC
- Dr. Jeongik Hong, Division Director, Division of Public Health Emergency Management, KCDC
- Dr. Hyungmin Lee, Division Director, Division of Healthcare-Associated Infection Control, KCDC
- Dr. Dong Han Lee, Division Director, Division of Infectious Disease Surveillance, KCDC
- Dr. Yeonho Kang, Division Director, Division of Biosafety Evaluation and Control, KCDC
- Dr. Park Gi-Jun, Division Director, Division of Quarantine Support, KCDC
- Dr. Tae-Jong Son, Senior Research Officer, Division of Quarantine Support, KCDC

Participating institutions:

Health sector

- Korea Centers for Disease Control and Prevention (KCDC)
  - » Center for Infectious Disease Research
  - » Division of Infectious Disease Surveillance
  - » Division of Infectious Disease Control
  - » Division of Risk Assessment and International Cooperation
  - » Division of Public Health Emergency Management
  - » Division of Resource Management
  - » Division of Bioterrorism Preparedness and Response
  - » Division of Quarantine Support
  - » Division of Antimicrobial Resistance
  - » Division of Vaccine-Preventable Diseases Control and National Immunization Programme
  - » Division of Healthcare-Associated Infection Control
  - » Office of Communication
  - » Division of Laboratory Diagnosis Management
  - » Biosafety Evaluation and Control
  - » Division of Bacterial Diseases
  - » Division of Viral Diseases
- Ministry of Health and Welfare (MOHW)
  - » Division of Disease Control Policy

Other ministries or agencies

- Ministry of Agriculture, Food and Rural Affairs (MAFRA)
  - Avian Influenza and Small Animal Health Control Division
  - Foot-and-Mouth Disease and Large Animal Health Control Division
  - Quarantine Policy Division
- Animal and Plant Quarantine Agency (APQA)
  - Bacterial Disease Research Division
  - Veterinary Epidemiology Division
  - Veterinary Drugs and Biologics Evaluation Division
  - Research Planning and Management Division
  - Animal Quarantine Division
  - Avian Disease Research Division
- Ministry of Environment (MoE)
  - Environmental Health Policy Division
  - Chemical Policy Division
  - Chemical Safety Division
  - Waste Resources Management Division
- Ministry of Food and Drug Safety (MFDS)
  - Food Safety Policy Division
  - Customer Risk Prevention Policy Division
  - Food Safety Management Division, Food Safety Policy Bureau
  - Foodborne Diseases Prevention and Surveillance Division, Food and Consumer Safety Bureau
  - Clinical Trials Management Division, Pharmaceutical Safety Bureau
- Ministry of the Interior and Safety (MoIS)
  - Division of Disaster Response
- Ministry of Oceans and Fisheries
  - Fishery Vessel Policy Team
- Ministry of National Defence (MoND)
  - Division of Health and Welfare Bureau
- Korea Nuclear Safety Institute
- Nuclear Safety and Security Commission (NSSC)
- Radiation Safety Division
- Korea Human Resource Development Institute for Health and Welfare

Supporting documentation provided by the Republic of Korea

National legislation, policy and financing

- Framework Act on the Management of Disasters and Safety
- Nuclear Safety Act
- Chemical Control Act
- Act on the Prevention of Contagious Animal Diseases
- Infectious Disease Control and Prevention Act
- Quarantine Act
- National Finance Act
- Railroad Safety Act
- Traffic Safety Act
- Special Act on the Safety Control of Public Structures
- Marine Environment Management Act
- Countermeasures Against Natural Disasters Act
- Forest Protection Act
- Medical Devices Act
- Tuberculosis Prevention Act
- Prevention of Acquired Immunodeficiency Syndrome Act
- Plan to reform the National Infectious Disease Control System
- National Plan for Infectious Disease Control and Prevention
- Infectious Disease Emergency Management Plan
- 5-year Strategic National Stockpile Plan
- Standard Manual for Infectious Disease Emergency Management
- Research Report: A Study on the Reform of Communicable Disease Control and Quarantine Systems in Compliance with the Revision of the International Health Regulations, 2006
- Korea-China-Japan Joint Action Plan for Joint Response to Pandemic Influenza
- Press Release on the designation of the National IHR Focal Point

IHR coordination, communication and advocacy

- Framework Act on the Management of Disasters and Safety
- Infectious Disease Control and Prevention Act, and the Quarantine Act
- Operational Guideline for Infectious Disease Emergency Management
- Standard Manual for Infectious Disease Emergency Management
- Standard Operating Procedure for IHR communication
- The 2015 MERS Outbreak in the Republic of Korea: Learning from MERS
- IHR communication log

- Examples of risk assessment information shared with the Division of Risk Assessment and International Cooperation in KCDC
- Examples of risk assessment information distributed by the Division of Risk Assessment and International Cooperation in KCDC
- Examples of daily, weekly and monthly reports:
- Daily Report on National Notifiable Diseases
- Daily Report on Bioterrorism Diseases
- Weekly Infectious Diseases Trend Report
- Weekly Sentinel Surveillance Report
- Weekly Report on Malaria Patients
- Weekly Surveillance Data on Culex tritaeniorhynchus (JE)
- Monthly Surveillance Report on Vibrio
- Risk Assessment and Evaluation Report
- E-News Letter for Korean Medical Association

Antimicrobial resistance

- National Action Plan on Antimicrobial Resistance (2016 - 2020)
- National Anti-Doping System Reorganization Plan, 2015
- Recommendation to promote healthcare-related infection prevention and control measures, 2015
- Infection Disease Surveillance Annual
- Report on Medical Infection Monitoring System for National Intensive Care Unit
- Report on National Surveillance Site Infection Monitoring System
- National antibiotic resistance safety management project report
- APQA Research Report – Report on the Establishment of Monitoring System for Antibiotic Resistant Bacteria in Livestock
- APQA Research Report – Risk Assessment of Antimicrobial Susceptibility of Antibiotics for Animals
- APQA Research Report – Actual use and risk tolerance of macrolide antibiotics in domestic pig farmers
- APQA Research Report – Profiling for the development of a long-term roadmap for antimicrobial resistance assessment for animals
- Development of resistance reduction and management technology for fluoroquinolone antibiotics resistant bacteria derived from chicken and chicken

Zoonotic diseases

- Infectious Disease Control and Prevention Act
- Act on the Prevention of Contagious Animal Diseases
- Wildlife Protection and Management Act
- Framework Act on the Management of Disasters and Safety
- Act on the Public Service Veterinarians for Prevention of Epidemics
- Guidelines for the Management of Zoonotic Disease (CID, Rabies, Brucellosis, Q fever)
- Standard Manual of Infectious Diseases Emergency Management
- Operational Manual for Livestock Disease Crisis Response

Food Safety

- Ministry of Food and Drug Safety White Paper
- Food Safety Management Guidelines
- Guidelines on the Management of Food- and Water-borne Diseases
- Guidelines on the Evaluation of the Results of Epidemiological Investigation into Food- and Water-borne Diseases
- Guidelines on the Evaluation of the Response to Food-borne Diseases
- Food Safety Accident Emergency Response Manual
- Data from the Food-borne Disease Report Management System
- Data from the Integrated Disease and Health Management System
- Data from the Food-borne Disease Early Warning System
- Data from the MFDS mobile lab
- Data from the Emergency Reporting System on Hazardous Food
- Data from the Hazardous Food Sales Prevention System
- Data from the Integrated Disaster Management System of the Korea Communications Commission
- Data from the education on food-borne diseases and simulation trainings for responding to food-borne diseases
- Data from the food-borne disease prediction map
- Data from the VibrioNet
- Data from the PulseNet Korea
- Data from the Korea Integrated Pathogen Information Network
- Data from the testing and inspection system
- Data from the operation of the Council on Food-borne Disease Countermeasures
- Data from the pan-governmental Committee for Eradicating Unwholesome Food
- Data from the Food Safety Policy Committee
- Data from the Food Sanitation Deliberation Committee
- Data from the operation of the Public-Private Communication Committee for Food and Drug Hazards

- Data from the business agreements with consumer organizations
- Data from the operation of the Reciprocal Communication Channel and the Consumer Forum
- Data from the Consumer Food and Drug Safety Course
- Data from the MFDS food management system
- Risk assessment report
- Risk profile
- Newsletter consumer talk-talk
- Easy-to-read risk information
- Food information portal Food Safety Korea (www.foodsafetykorea.go.kr)

Biosafety and biosecurity

- Infectious Disease Control and Prevention Act
- Act on the Promotion of Collection, Management, and Utilization of Pathogen Resources
- Act on the Control of the Manufacture, Export and Import of Specific Chemicals and Chemical Agents for the Prohibition of Chemical and Biological Weapons
- Foreign Trade Act
- Transboundary Movement of Living Modified Organisms Act
- Act on the Prevention of Contagious Animal Diseases
- Plant Protection Act
- Act on the Preservation, Management and Use of Agro-bioresources
- Aquatic Life Disease Control Act
- Wastes Control Act
- Wildlife Protection and Management Act
- Act on the Establishment of Safe Laboratory Environment
- Occupational Safety and Health Act
- Laboratory Animal Act
- Animal Protection Act
- Framework Act on the Management of Disasters and Safety
- National Health Insurance Act
- School Health Act
- Aviation Safety and Security Act
- Management Code of Agro-bioresources such as Contagious Animal Pathogen etc.
- Guideline of Genetically Modified Experiment
- Guidelines for the Safe Transport of Infectious Substance in Korea
- Korea Laboratory Biosafety Guidelines
- Korea Biosafety Standard and Guidelines, draft

- Ordinance for prohibitory goods in postal content, the Post Office
- Volume, weight and packaging solution of postal mails, the Post Office
- Parcel-Post Regulations and Final Protocol, the Post Office
- Documentation of dangerous pathogen collections housed in the Republic of Korea: Select agents
- List of biosafety officers certified who may potentially handle high-risk pathogens
- Policy document for biorisk or biosafety management in a facility
- Membership in good standing of a regional or international biosafety association
- OIE Country PVS report

Immunization

- Infectious Disease Control and Prevention Act
- Regular Vaccination Act
- Personal Information Protection A
- Regulation of Biomedicine Manufacturing and Sale
- Infectious Disease Control and Prevention Plan (2013-2017)
- Comprehensive Plan for Safe Supply of National Essential Medicine
- Immunization Program Guideline (2016-2017)
- Vaccine Storage Management Guidelines
- Guidelines for School Entry Requirement Program
- Guidelines for Childhood National Immunization Program
- Guidelines for the Prevention, Care, and Treatment of Persons with Chronic Hepatitis B infection
- Guidelines for elderly Immunization Program against Invasive Pneumococcal Disease
- Guidelines for National Influenza Immunization Program
- Guidelines for First step to Women's Health Program
- Guidelines for Adverse Event Following Immunization
- Checklist for on-site inspection at public health centers and private medical institutions
- Five years of National Measles Eradication White Paper
- Report on People's Recognition on National Immunization Program
- 2012 Knowledge Sharing Program: Children Immunization Program
- Investigation and Management of Children with No Vaccinations Recorded on the National Immunization, Chungnam National University, 2015
- A Parent's Guide to Vaccination (9 languages)
- Press release, National Childhood Vaccination Coverage among Children Aged 3 years in Korea 2016, July 27, 2017
- Press release: Vaccination week cerebration, April 26, 2016

National laboratory system

- Infectious Disease Control and Prevention Act
- National Health Insurance Act
- Public health and Environment Research Institute Act
- Occupational Safety and Health Act
- Act on the Establishment of Safe Laboratory Environment
- Transboundary Movement of Living Modified Organisms Act
- Enforcement Regulations of the MOHW and its affiliated organizations
- Operation Regulations for Examination and Examination Committee of Korea Centers for Disease Control and Prevention
- The Guidelines for the Safe Transport of Infectious Diseases
- The Guidelines for Infectious Diseases Control
- 2015 Infectious Material Safety Transport Guidelines
- 2016 Integrated Guideline for National Notifiable Infectious Disease Diagnosis
- Implementation Strategy for the Second National Infection Crisis Response Technology Development Plan
- Case Definitions for National Notifiable Infectious Disease
- Diagnosis Criteria for Infectious Diseases
- 2016 National notifiable infectious disease diagnosis report standard
- Korea Centers for Disease Control and Prevention test request rule

Real-time surveillance

- Infectious Disease Control and Prevention Act
- Diagnosis Criteria for Infectious Diseases
- Infectious Disease Surveillance Yearbook 2015
- Case Definitions for National Notifiable Infectious Diseases
- Guidance on Surveillance and Reporting Infectious Diseases
- Daily trends of infectious diseases report
- Daily infectious disease event report
- Communicable Diseases Weekly Report
- Public Health Weekly Report
- Weekly infectious disease analysis and assessment reports
- Communicable Diseases Monthly Report

Reporting

- Infectious Disease Control and Prevention Act
- Act on the Prevention of Contagious Animal Diseases
- Plan for Reform the National Disease Control System
- Standard Operating Procedures for IHR (2005)
- Standard Operating Procedures for OIE Reporting by the MAFRA
- MAFRA's Avian Influenza Guidelines for Emergency Actions

Workforce development

- Infectious Disease Control and Prevention Act
- Health and Welfare Statistics Annual Report
- Report on the status of health personnel in Korea (Korea Health Promotion Institute)
- Reorganization plan of mosquito infectious disease response organization (MoIS)
- Annual Status of Epidemic Intelligence Officers
- List of training under the 2017 curriculum of the Korean Human Resource Development Institute for Health & Welfare
- Implementation plan, operation guide and lecture materials for the training course for the Field Management Training Program (FMTP) in 2017
- Research report on the Field Epidemiology Training Program (FETP) in 2017
- Planning and operation guidelines for the Infection Disease Management High Policy Education in 2017
- 2017 Plan to improve education on municipal infectious diseases
- 2017 New Public Health Doctor Central Job Training Promotion Plan and Educational Textbook

Preparedness

- Infectious Disease Control and Prevention Act
- White Paper on Pandemic Influenza Response 2009 - 2010
- White Paper on MERS, 2015
- Master Plan for National Safety Management (2015 - 2019)
- Master Plan for Safety Innovation, 2015
- Infectious Disease Control and Prevention Plan (2013 - 2017)
- Infectious Disease Emergency Management Plan, MOHW
- The Preparedness and Response Plan for Pandemic Influenza (2006) and the subsequent revisions
- Standard Manual for Infectious Disease Emergency Management and the Operational Guideline for Crisis Management

Emergency response operations

- Framework Act on the Management Disasters and Safety
- Regulation on the EOC Operation
- Regulations on the Operation of the Epidemiological Investigation Team
- Operation Regulations on the National Designated Isolation Beds
- White Paper on H1N1 Influenza Response (2009 - 2010)
- White Paper on MERS, 2015
- Plan to reform the National Infectious Disease Control System
- Standard Manual for Infectious Disease Emergency Management
- EOC Operation Manual
- Main infectious disease guidelines (MERS, avian influenzaAI, Bioterrorism, Ebola virus disease, Lassa fever)
- Formation and education plan of the rapid response team, first-half of 2017
- Result Report on Detailed Design of Emergency Operations Room and Infection Crisis Management System

Linking Public Health and Security Authorities

- Infectious Disease Control and Prevention Act
- Quarantine Act
- Act on Anti-Terrorism for Protection of Citizens and Public Safety
- Child-Care Support Act
- 2001 Plan for Bioterrorism Preparedness and Response and subsequent revised versions
- 2002 Guideline for Bioterrorism Preparedness and Response and revised versions
- Various training materials
- Table-top exercise plans, scenarios, and reports
- MOU between KCDC and the Ministry of National Defence

Medical countermeasures and personnel deployment

- Infectious Disease Control and Prevention Act
- Pharmaceutical Affairs Act
- Overseas Emergency Relief Act
- Act on 119 Rescue and Emergency Medical Services
- Fire Officers Act
- Korea International Cooperation Agency Act
- International Cooperation Personnel Act
- Korea Foundation for International Healthcare Act
- Infectious Disease Emergency Management Plan

- 5-year Strategic National Stockpile Plan
- Pandemic Influenza Preparedness and Response Plan
- Emergency Dispensing Plan
- Overseas Emergency Relief Manual
- West Africa Ebola Virus Emergency Relief White Paper
- Ebola Response KDRT Dispatch Guidance

Risk communication

- Risk Communication Guideline for Public Health Emergencies
- Standard Operating Procedure for Risk Communication for Public Health Emergencies
- Organization and duty table of Office of Communication
- Budget documents for comprehensive emergency management of emerging infectious diseases
- History of education and training on risk communication
- Overview of 1339 call center operation
- Overview of Social media channel operation
- Overview of Kakao Talk channel operation
- Overview of operation of 100 Communication Supporters (citizens) for risk communication
- Overview of Experts' Communication Advisory
- Overview of media monitoring
- Overview of the KCDC National Awareness Survey
- Plan to host the High-level Meeting on Risk Communications
- KCDC fact check plan for online rumor management
- Official documents on internal and external cooperation (list)
- Press release on the TB infection of staff at large hospitals
- Cases of explanatory information/ data
- Briefing of media briefing and implementation performance
- Results of the operation of Red/Blue teams in response to MERS-CoV suspected patients

Points of entry

- Quarantine Act
- Infectious Disease Control and Prevention Act
- Act on the Prevention of Contagious Animal Diseases
- Plant Protection Act
- Standard Manual for Infectious Disease Emergency Management
- Operational guideline for Infectious Disease Emergency Management
- Operation Regulations on the National Designated Isolation Unit
- National Quarantine Assessment Plan

- Guideline for Quarantine Services
- Guideline for each infectious disease (MERS, Lassa fever, avian influenza human infection)
- Research Report: Research of the revisions of the regulations pertaining to the communicable disease prevention and quarantine acts in accordance with the revised International Health Regulations, 2007
- National Quarantine Stations Evaluation Report, 2017
- Guide letter of Quarantine workforce training courses, 2017
- Guide letter of the 16th meeting of the central institutions councils of CIQ, 2016

Chemical events

- Chemical Substance Management Act
- Act on Registration and Evaluation of Chemical Substances
- Environmental Health Law
- Residual Organic Pollutant Management Act
- Law Concerning Liability and Remedies for Damages from Environmental Pollution
- Regulation on the Census of Chemical Substances
- Regulation on the Results of Chemical Investigation and Operation of Information Disclosure System
- Regulation on the Specific Handling Standard for Chemical Substances (No. 2017-2 of the Chemical Safety Guideline)
- Regulation for the Wearing of Personal Protective Gear of Hazardous Chemical Handlers
- Regulation on Classification and Labelling of Chemical Substances
- Regulation on Export of Chemical Substances Pursuant to the Convention on Preliminary Notification Approval Procedures in the Trade of Hazardous Chemicals
- Regulation on Small Quantity Standards for Hazardous Chemical Substances
- Regulation on OTC Outcome Evaluation
- Regulation on Installation, periodic, Occasional Inspection and Safety Diagnosis of Hazardous Chemical Handling Facilities
- Regulation on the Operation and Management of Hazardous Chemical Substances
- Regulation on the Preparation of Chemical Accident Safety Management Plan
- Regulation on Qualification of Hazardous Chemical Substance Manager
- Regulation on the Preparation of the Risk Management Plan
- Regulation on the Protection of Chemical Substances
- Designation of Prohibited Substances for Toxic Substances and Restricted Substances
- Guideline on the Organization and Operation of Chemical Accident Investigation Teams and their Impact Investigation
- Measurement and Analysis of Chemical Accident Site Management Guideline
- Hazardous Chemical Spill Accident Crisis Management Standard Manual
- Hazardous Chemical Spill Accident Crisis Response Practical Manual

- Hazardous Chemical Spill Incident Site Action Manual
- Chemical Terrorism Crisis Response Practical Manual
- Chemical Terrorism and Accident Prevention Training Plan
- Notification on standards for installation and management of hazardous chemical substance handling facilities
- Provision of immediate notification of chemical accident
- Life Chemical Product Safety Management
- Safety distance notice from outside wall of hazardous chemical handling facility protection object

Radiation emergencies

- Act on Physical Protection and Radiological Emergency
- Nuclear Safety Act
- Act on Protective Action Guidelines against Radiation in the Natural Environment
- Nuclear Damage Compensation Act
- Framework Act on the Management of Disasters and Safety
- Act on Anti-terrorism for the Protection of Citizens and Public Security
- Presidential Decree on Criteria for the Payment of Expenses for Social Disaster Relief and Restoration
- Notice on Radiological Emergency Preparedness for Nuclear Licensee
- Notice on Inspection for Radiological Emergency of Nuclear Licensee
- Notice on Reporting and Public Announcement of Accidents and Incidents for Nuclear Power and Radiation Utilization Facilities
- Radiation Emergency Plans of Nuclear Power Plants
- Comprehensive Plan for Nuclear Safety
- National Radiological Emergency Plan
- Comprehensive Plan for Protection from Radiation in the Natural Environment
- The Standard Manual for Management of Emergencies in the Area of Nuclear Safety (Radiation Leakage)
- The Practical Manual for Emergency Response in the Area of Nuclear Safety (Radiation Leakage)
- The Action Manual in the area of Nuclear Safety (Radiation Leakage)
- The Standard Manual for Managing Emergencies Involving Radiation Leak in Neighbouring Countries
- The Practical Manual for Responding to Emergencies Involving Radiation Leak in Neighbouring Countries
- The Practical Manual for Responding to Emergencies Involving Radiological Terrorism (Restricted)
- The Operation Manual of Radiation Emergency Medical Service Center

Presentations

- Presentation on the Republic of Korea self-assessment
- Presentation on overview of the Republic of Korea public health system
- Presentations on each of the 19 JEE technical areas

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