ICT-based Responses to COVID-19 of Korea

National Infectious Disease Management in Rep. of Korea

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Course Description

This course will focus on National Infectious Disease Management in Rep. of Korea. It will provide National Infectious Disease Surveillance System, National Tuberculosis Elimination Project, National Immunization Program, the experiences to respond to past epidemic by KDCA and Surveillance and Outbreak Investigation of COVID-19 to give you insight for policy-making on national infectious disease management.
Course Structure

1. National Infectious Disease Management System
2. National Infectious Disease Surveillance System
3. National Tuberculosis Elimination Project
4. National Immunization Program
5. How Korea Responded to Past Epidemic
7. Way forward
Course Objectives

To understand the national infectious disease management and surveillance system in Rep. of Korea

To share the experience of National Tuberculosis Elimination Project, National Immunization Program, how to respond to epidemic cases, and Surveillance and Outbreak Investigation of COVID-19
National Infectious Disease Management System

Why the government should manage infectious disease in a national level?

(if) the number of confirmed cases increase due to the spread of an infectious disease,

1. Secondary spread due to index patients

2. Treatment costs for the disease, and economic damage increase

3. Patients who need to be treated due to other diseases aren’t able to receive medical service if the number of infected patients increase

4. National security crisis results from infectious disease abroad
As of Sep 9, the confirmed cases are 18,655.
National Infectious Disease Management System

Korea Disease Control & Prevention Agency

Commissioner

- Spokesperson
- Emergency Operations Center
- Director General for Public Health Emergency Preparedness

Vice Commissioner

- Director for Audit and Inspection

Director General for Planning and Coordination
- Division of General Affairs
- Bureau of Infectious Disease Policy
- Bureau of Infectious Disease Emergency Preparedness and Response
- Bureau of Infectious Disease Diagnosis Control
- Bureau of Healthcare Safety and Immunization
- Bureau of Chronic Disease Prevention and Control
- Director General for Health Hazard Response

- Infectious Diseases Control
- Quarantine
- Public Health Emergency Response
- National Immunization Program
- Healthcare Associated Infection Control

Affiliated institution

- National Institute of Health
- National Institute of Infectious Disease
- National Quarantine Station
- Regional Centers for Disease Control and Prevention
- Mokpo National Hospital
- Masan National Tuberculosis Hospital

* Each name written in English may be subject to change.
01 National Infectious Disease Management System

Korea Centers for Disease Control and Prevention has been promoted to the **Korea Disease Control and Prevention Agency (KDCA)** as a "control tower" to respond swiftly and effectively to the outbreak of emerging infectious diseases.

<table>
<thead>
<tr>
<th>Past</th>
<th>Present</th>
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</thead>
<tbody>
<tr>
<td>Centers for Disease Control and Prevention (MOHW-affiliated organization)</td>
<td>Organization</td>
</tr>
<tr>
<td>Ministry of Health and Welfare (Policy-making)</td>
<td>Decision Making Structure related to Infection Diseases</td>
</tr>
<tr>
<td>Centers for Disease Control and Prevention (Policy Implementation)</td>
<td>Disease Control and Prevention Agency (independent agency)</td>
</tr>
<tr>
<td>No other regional organization</td>
<td>Regional System</td>
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<tr>
<td></td>
<td>Establish regional center (support disease prevention and control of local governments)</td>
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<td></td>
<td>Exercise its own autonomy in policy making and implementation</td>
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01 National Infectious Disease Management System

Korea’s Infectious Disease Management Policy

Local gov’s organizations to support infectious diseases management as well as epidemiological investigation teams in cities/provinces etc. enable the government to control infectious disease nationwide.

EOC(Emergency Operation Center) helps swiftly possible information collection, dissemination, and comprehensive management of an public health crisis.

Notifiable diseases are designated, and the severity, transmissibility, isolation level, and reporting time are determined by the characteristics of each infectious disease. (e.g. infectious disease in Grade 1 must be reported the moment it is detected.)
01 National Infectious Disease Management System

Basic plan for the prevention and control of infectious diseases for the next 5 years

1. **Enhance initial response capability**
   Operate infectious disease control center in cities and provinces, and Emergency Operation Center for infectious disease response

2. **Expand support for vaccination**
   Make national vaccination free

3. **Strengthen response capability for public health crisis response**
   Increase the number of hospital beds for infectious diseases and reserve necessary supplies including vaccines

4. **Establish response strategies for infectious diseases depending on their mode of transmission**

5. **Promote international cooperation**
   International cooperation with foreign research institutions is needed since infectious disease outbreaks are occurring internationally

Source: Basic plan for the prevention and control of infectious diseases (2013)
01 National Infectious Disease Management System

Data Dissemination and Communication

- Disease Web Statistics System
- Public Health Weekly Report
- Infectious Disease Surveillance Yearbook
- Dissemination of the analyzed data
## National Infectious Disease Surveillance System

### National Notifiable Infectious Disease

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>The infectious diseases that spread through bioterrorism or infectious diseases with a high mortality rate or a high risk of mass outbreak, requiring immediate reporting and high-level isolation</td>
<td>Ebola virus disease, SARS, MERS, Animal influenza infection in humans, Novel influenza etc.</td>
</tr>
<tr>
<td>Grade 2</td>
<td>The infectious diseases that shall be reported within 24 hours of outbreak or epidemic in consideration of the possibility of transmission and require isolation</td>
<td>Tuberculosis, Varicella, Measles, Cholera, Hepatitis A, Hansen’s disease (Leprosy), Scarlet fever etc.</td>
</tr>
<tr>
<td>Grade 3</td>
<td>The infectious diseases that shall be reported within 24 hours of outbreak or epidemic as the outbreak thereof requires continuous surveillance</td>
<td>Hepatitis B, Japanese encephalitis, Hepatitis C, Malaria, AIDS, Zika virus etc.</td>
</tr>
<tr>
<td>Grade 4</td>
<td>The infectious diseases that require sentinel surveillance to investigate whether they are epidemic</td>
<td>Influenza, Norovirus infection, Acute respiratory infection etc.</td>
</tr>
</tbody>
</table>
02 National Infectious Disease Surveillance System

KNNDSS* Web System

(GNR) Hospital Physician

Notification → Feedback

City or county level
: Public Health Center (255)

Report → Feedback

Metropolitan or Province level
: Dept. of Health (17)

Report → Feedback

Central level
: KCDC (1)

Feedback materials

- Statistical system
- GIS
- KDCA Homepage
- PHWR, PHRP

* KNNDSS : Korean National Notifiable Disease Surveillance System
### National Tuberculosis Elimination Project

#### Directions of Strengthening Measures of TB Prevention Management

##### Vision

**Society without Tuberculosis, A Healthy Nation**

<table>
<thead>
<tr>
<th>Prevention and early detection of tuberculosis</th>
<th>Patient Care and Contact Management</th>
<th>Expansion of TB R&amp;D and management of essential materials</th>
<th>Strengthening the response system of tuberculosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Strengthening the examination for the elderly</td>
<td>- Strengthening patient isolation and improving treatment quality</td>
<td>- Expanding researches including diagnosis and medicine and strengthening infrastructure</td>
<td>- Establishing a par-government response system</td>
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<tr>
<td>- Eliminating blind spots for screening of foreigners and homeless people</td>
<td>- MDR-TB, non-compliant, vulnerable patients Strengthening medical support</td>
<td>- Localizing vaccine and establishing stable supply and demand system</td>
<td>- Strengthening local governments and community response capacity</td>
</tr>
<tr>
<td>- High-risk patients, underlying disease patients, etc.</td>
<td>- Strengthening patient management, including customized medication management</td>
<td>- Managing essential materials of National TB Project and upgrading of examination system</td>
<td>- Improving awareness of TB personnel, medical professionals and public</td>
</tr>
<tr>
<td>- Expanding support for high risk group’s medical examination</td>
<td>- Expanding of latent TB screening and treatment support</td>
<td></td>
<td>- Strengthening international cooperation</td>
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03 National Tuberculosis Elimination Project

TB patients management

The public health center may order the patients with MDR TB, patients with poor compliance to be hospitalized at a medical institution

- These patients should visit the public health center daily to check taking anti-TB agent after discharging the hospital
- The local government shall take necessary measures to sustain the livelihood of the patient or his/her dependents, such as subsidization of expenses

All medical expenses are supported by the national health insurance.

TB management program for the homeless

Screening program for the elderly

Contagious tuberculosis patients should be suspended, or prohibited from engaging in the personal service occupation until a decision on the cessation of contagiousness is rendered.
**03 National Tuberculosis Elimination Project**

**Investigation of TB outbreak**

- Investigate all family members of the patients
- Outbreak investigation is performed when a patient is reported in the group facility such as school, company, or social welfare facilities
- The cost is supported by the national health insurance

**Method**

- **TB screening**: CXR, sputum smear/culture or TB-PCR
- **Latent TB screening**: TST, IGRA
04 National Immunization Program

National Immunization Program for children

Eligibility
- Children under 12 years of age

Supported contents
- Support for all immunization costs of government-designated vaccine

Supported vaccines
- 17 species
  - BCG (Percutaneous), Hepatitis Type B, DTaP, Td, Tdap, IPV, DTaP-IPV, DTaP-IPV/Hib, Hib, Pneumococcal vaccine, MMR, Varicella, Japanese Encephalitis (inactivated vaccine/activated vaccine), Hepatitis A, HPV, Flu

Diagram:
- KCDC: Operate the education program
- Entrusted clinic: Register the vaccination record
- Public Health Center: Request the reimbursement of expenses, Inform the vaccination schedule Vaccination
- Vaccine: Inform the vaccination schedule Vaccination

04 National Immunization Program

School-entry Immunization Requirement

**Subject and vaccine**

Children entering elementary school

5\textsuperscript{th} dose of DTaP, 4\textsuperscript{th} dose of IPV, 2\textsuperscript{nd} dose of MMR, Japanese Encephalitis

Students entering middle school

Tdap and HPV

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**Immunization Registry System**

1. Students & Parents
   - Sign up the website and check the vaccination completion

2. Clinic & Hospital
   - Vaccination and request registry
   - Register the vaccination record
   - Manage vaccination completion record and inform the unvaccinated students

3. Immunization Registry System
   - Send the information of students

4. School & Education Offices
   - Send the vaccination history of students
   - Inspect the completion of vaccination and recommend vaccination to unvaccinated students
   - Submit the vaccination completion record

5. Operate the cooperation system
04 National Immunization Program

Hepatitis B Perinatal Transmission Prevention Program

Launched in July 2002

In conjunction with the Korean Medical Association

Covered the 100% cost

- HBIG
- Three doses of hepatitis B vaccine
- HBsAg and anti-HBs testing
- For all infants born to HBsAg positive mothers
05 How Korea Responded to Past Epidemic

SARS(2003) : a viral respiratory disease to spread through small droplets of saliva

- Control tower (president/prime minister) to respond to SARS before the first confirmed case occurred
- 24-hour emergency working system and secured hospital beds for isolated treatment
- Testing and contact tracing on people entering from risk areas
- Press release 120 times / briefings to the public 190 times

3 probable cases, 0 deceased

Lesson learned

- KCDC was established in 2004.
- Quarantine & disease prevention and control functions were unified to KCDC.
04 National Immunization Program

Main Strategy for the Response of Pandemic Novel Influenza(H1N1), 2009

- Vaccination for Medical Personnel (10/27)
- Distribute Antiviral Agent through all Pharmacies (10/28)
- Containment (Quarantine, Isolation) (4/28)
- Mitigation (Treatment) (7/29)
- Operate the Designated Hospital (8/21)
- Expand the Candidate for Antiviral Agent Administration (9/1)
- Vaccination for Students (11/11)
- Vaccination for Patients with Chronic Disease (1/18)
- Vaccination for Healthy Adults (1/25)

National Disaster Phase Alert
- Caution (4/28-7/20)
- Alert (7/21-11/2)
- Severe (11/3-12/10)
- Alert (12/11-3/7)
- Caution (3/8-3/31)

WHO Pandemic Phase
- Phase 5 (4/28-6/10)
- Phase 6 (11/3-12/10)

Main Strategy
- Containment (Quarantine, Isolation)
- Mitigation (Treatment)
- Mitigation (Vaccination)
How Korea Responded to Past Epidemic

H1N1(2009): a respiratory disease of pigs caused by type A influenza viruses, and spread among people

- Central influenza response center under MOHWFA immediately after the outbreak
- 24-hour emergency working system
- Port screening and fever detection on people entering the airport → strengthen screening, carry out phone tracing investigation
- Trace down and isolate suspected cases during quarantine procedure
- Inject antiviral agent & vaccination, and later the infected dropped sharply

Approx. 740,000 infected, 270 deceased*

Lesson learned
- Additional budget was secured to establish isolated ICU in hospital, isolated facilities in nation quarantine station etc.

*More than 16,000 deceased cases were reported according to WHO.
How Korea Responded to Past Epidemic

**MERS(2015)**: a virus transferred to humans from infected dromedary camels

- A total of 186 confirmed patients with MERS-CoV infection across 16 hospitals were identified
- 44.1% patients exposed in hospitals, 32.8% caregivers, and 13.4% healthcare personnel
- 38 fatal cases


*Middle East Respiratory Syndrome Coronavirus Outbreak in the Republic of Korea, 2015.*
05 How Korea Responded to Past Epidemic

Key Lessons learned from MERS Outbreak in 2015

Mostly ‘Hospital-based outbreak’

- Extensive Laboratory Tests
- Preemptive isolation
- Continuous reflection and promotion based on the results through ‘After Action Review’ of response on MERS suspected cases reported
06 How Korea Responded to Past Epidemic

Infrastructure changes after MERS Outbreak in 2015

New
- Smart quarantine
- Emergency Operation Center (24 hours/7 days)
- Field response team
- Risk communication (Dedicated department/officer)

Expansion
- Negative pressure room
- FETP* and Qualified ICP** staff
- Inpatient room (under 4 patients)
- Comprehensive Nursing service

* FETP: Field Epidemiology Training Program, ** ICP: Infection Control Practitioner
06 How Korea Responded to Past Epidemic

Emergency Operations Center (EOC)

Introduction

- The EOC operates 24/7 to receive notifications and collect information on the emerging and re-emerging infectious diseases such as MERS and COVID-19 that can cause public health crisis.
- The EOC manages outbreak situations to make sure that infections are properly handled according to the pre-distributed guidelines for specific infectious diseases.
05 How Korea Responded to Past Epidemic

Emergency Operations Center (EOC)

Functions and roles

Information gathering
Continuous collection and dissemination of domestic and international infectious disease information

Emergency response
When emergency situation of infectious disease occurs, the EOC will be expanded to the Response Action Team within KCDC or the Central Epidemic Control Countermeasure Headquarters

Regular response
24 hour reception of infectious disease events and maintenance of an ongoing response system

Rapid dissemination
Rapid dissemination of the response status to the persons in charge and related organizations when an infectious disease crisis situation is recognized
06 Surveillance and Outbreak Investigation of COVID-19

Timeline of Response on COVID-19 Pandemic in ROK

Dec 31, 2019
Cluster of cases of pneumonia of unknown origin reported to China National Health Commission

Jan 20, 2020
First confirmed case in Korea

Jan 23, 2020
Containment of Wuhan

Jan 30, 2020
Secondary infection case

Jan 31, 2020
Tertiary infection

Feb 7, 2020
COVID-19 test available at private

Feb 19, 2020
Big cluster occur (Shincheonji, Daenam Hopista)

Feb 20, 2020
First death case in Korea

Feb 21, 2020
Declare a ‘special management region’ in Daegu, Cheongdo

March 5, 2020
Declare a ‘special management region’ in Gyeongsan

Jan 8, 2020
1st case in Thailand

Jan 12, 2020
Named as 2019-nCoV; Whole genome sequence shared with WHO

Jan 22-23, 2020
1st Emergency Committee

Feb 1, 2020
1st Wuhan evacuee

Feb 4, 2020
Entry ban on foreigners with travel history to Hubei, China

Feb 12, 2020
Expand strict quarantine to HK, Macau

March 1, 2020
Establishment of Life Treatment Center

March 12, 2020
Guideline for high-risk working environment distributed

Jan 3, 2020
Raise up the alert level to Blue

Jan 8, 2020
1st case in Thailand

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Feb 23, 2020
Raise up the alert level to Red

March 1, 2020
Establishment of Life Treatment Center

March 12, 2020
Guideline for high-risk working environment distributed

Jan 30, 2020
WHO declare PHEIC of COVID 19

Feb 20, 2020
First death case in Korea

Feb 21, 2020
Declare a ‘special management region’ in Daegu, Cheongdo

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06 Surveillance and Outbreak Investigation of COVID-19

COVID-19 Response workflow: mitigation strategy

Early detection
- Epidemiological investigation
- Extensive lab testing
- Special entry procedure
- Self-diagnostic application

Classification of confirmed cases
- Mild
- Moderate
- Severe
- Very severe

Treatment & Care
- Facility (residential treatment center)
- Hospital
  - General hospital, or
  - Designated hospital for Infectious diseases, or
  - Tertiary hospital
Surveillance and Outbreak Investigation of COVID-19

Surveillance for early detection and containment

**Border screening by traveling history (epidemiologic link) and symptom**

- all travelers entering Korea since 1 April 2020
- 14-day quarantine from the day after arrival and monitored symptom

**Community based surveillance**

- Hospital
- Clinic
- Public health center
06 Surveillance and Outbreak Investigation of COVID-19

COVID-19 Contacts tracing

**Contents**

### Investigation
- **Interview**
  - Obtain information through patient interview (identify route)
  - If necessary, perform preemptive defense against infectious diseases

### Risk Assessment
- **Collect objective information**
  - Gather additional information
  - Check and verify results of the interview
  - Perform evaluation for the classification of contacts

### Classification of Contacts
- **Close contact**
- **Casual contact**
- **Move restriction**
- **Symptoms monitoring**

### Management of Contacts
- **Perform contacts classification and management by following guidelines**

**Method / Tool**

- **Interview**
  - Patient
  - Primary physician
  - Family

- **Investigate medical records**
- **Phone location information (Mobile GPS)**
- **Card transaction log**
- **CCTV (Closed-Circuit Television)**

Source: Osong Public Health Research Perspective 2020;11(1):60-63
07 Way forward

Strategy 1: Periodic reinforcement of the national prevention system

Prevention of Inflow
- International cooperation network
- Provision of information at all times and monitoring

Medical Route
- Analysis of transmission route
- Training for infection control in the medical institutions · support technologies

Field Response
- Response manual for emerging infectious diseases
- Provision of information to the public
- Expansion of infectious disease experts pool

Prevention of Spread
- Transfer of systematized disease prevention and control techniques
- R&D on infectious disease medicine and next generation disinfectants · disease control and prevention devices

Source: Basic plan for the prevention and control of infectious diseases (2013)
## 07 Way forward

### Strategy 2: Establishment of a system for infectious disease research and management

<table>
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<tr>
<th>R&amp;D</th>
<th>Control and Response</th>
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<tbody>
<tr>
<td><strong>National Science and Technology Council</strong></td>
<td>• Disease Control Headquarters&lt;br&gt;• Hospitals/ Prevention Institutions</td>
</tr>
<tr>
<td>• International cooperation network&lt;br&gt;• Provision of information at all times and monitoring</td>
<td></td>
</tr>
<tr>
<td><strong>Multi-Agency Infectious Disease Council</strong></td>
<td></td>
</tr>
<tr>
<td>• Policy, basic plan, investment method&lt;br&gt;• Identification and sharing of important situation within each agency</td>
<td></td>
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<tr>
<td><strong>Conduct periodic research on infectious diseases</strong></td>
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<tr>
<td>• Provision of research details and results&lt;br&gt;• Commercialization of research outcome&lt;br&gt;• Sharing of related infrastructure</td>
<td>• Monitoring of global infectious diseases&lt;br&gt;• Infectious disease control (monitoring, quarantine, etc.)&lt;br&gt;• Maintenance of disease control institutions</td>
</tr>
</tbody>
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**Provision of science technology-based information to the public**

• Provision of information on characteristics of the infectious disease and prevention guide<br>• Find demand for field-applied technologies

*Source: Basic plan for the prevention and control of infectious diseases (2013)*
Thank You
• KCDC(2013), Basic plan for the prevention and control of infectious diseases

• KCDC(2015), 'Middle East Respiratory Syndrome Coronavirus Outbreak in the Republic of Korea, 2015', Osong Public Health and Research Perspectives 6(4):269-278