Epidemiological characteristics and multi-sectoral countermeasures of MERS-CoV Outbreak in Korea

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Korea Centers for Disease Control and Prevention
Meeting of Experts
(10 – 14 August 2015)

Global Health Security Agenda
- Action Package Meeting

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I. Epidemiological characteristics of MERS-CoV Outbreak in Korea

II. Public Health Response Against MERS in Korea

III. Risk Communication
1. Epidemiological characteristics of MERS-CoV Outbreak in Korea
Route of Transmission of MERS-CoV
Index case (#1)

- 68/M (Previously healthy)

- Travel history
  - 24 Apr to 4 May: From Korea to Bahrain via Qatar, Saudi Arabia and UAE
  - Denied any contact to camel or eating camel meat
  - Casual contact with local buyers for business meeting
  - Denied of history of visiting local clinics or hospitals
  - Did not mention any history of travel to Middle east region until admission to SMC

- 11 May: Initial onset of symptom
  - Fever, myalgia, cough, dyspnea

- Medical care
  - 12 to 15 May: Visited Asan Seoul Clinic
  - 15 to 17 May: Admitted to Pyeongtaek St Mary H.
  - 17 May: Visited 365 Clinic (Seoul)
  - 17 May: Visited Samsung Medical Center (SMC)
  - 18 to 20 May: Admitted to SMC

- 20 May: Transferred to National Isolation Hospital
- 20 May: MERS Confirmed
Notable case history (#14)

- **35/M**

- **Contact history**
  - Admitted in patient room no. 8110(same ward of case #1) of Pyongtaek(PT) Hospital from May 13 to 20

- **Clinical history after being discharged from PT hospital**
  - May 21, high fever
  - May 21 to 25, admitted to PT Hospital again(room no. 7106)
  - May 25 to 27, transferred to Good Morning(GM) Hospital

- May 27, transferred to Samsung Medical Center(SMC)

- **MERS confirmed on May 30**

- **Contact investigation**
  - PT, GM hospital and SMC
  - patients in a same room, Doctors, Nurses, General staffs in the hospital

- Family or inmates who serve care for this case
  - Transportations
Notable case history (#16)

- 40/M
- Contact history
  - Admitted in patient room no. 8112(same ward of case #1) of Pyoungtaek(PT) from May 15 to 18
- Clinical history after being discharged from PT hospital
  - May 20, chillness and febrile sensation (not go to hospital)
  - May 25 to 28, admitted to Daechong Hospital
  - May 28 to 30, transferred to Konyang Hospital

- After May 30, transferred to national designated isolation bed
- MERS confirmed on May 31
- Contact investigation
  - Daechong, Konyang hospital
- Patients in a same room, Doctors, Nurses, General staffs in the hospital
- Family or inmates who serve care for this case
Epi. curve as of 21 June 2015

A total of 169 cases from #1
Epi. curve as of 21 June 2015

A total of 36 cases from #1

PTSMH
A total of 83 cases from #14
Epi. curve as of 21 June 2015

DCH: 13 cases
GYH: 11 cases
A total of 24 cases from #16

May

June

GYH
(May 28 to 30)

DCH
(May 25 to 28)
Regional distribution of MERS cases (Facility)

- 84 healthcare facilities are currently involved in outbreak
- Cases are treated in 39 facilities
- A total of 186 patients are confirmed including 176 discharging patients
- A total of 36 deaths are reported
Demographic characteristics of cases

<table>
<thead>
<tr>
<th></th>
<th>N=186</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incubation period</strong></td>
<td>Avg. 6.95 days (SD: 3.48 days)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>55 years old</td>
<td>-</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>16-86 years old</td>
<td>-</td>
</tr>
<tr>
<td><strong>≥60 years old</strong></td>
<td>68 years old</td>
<td>40.2</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>111</td>
<td>59.7</td>
</tr>
<tr>
<td><strong>Lists of people by occupation</strong></td>
<td>General (Patient/visitors): 147 Healthcare worker: 23 Caregiver: 8</td>
<td>79.3 12.4 4.3</td>
</tr>
<tr>
<td><strong>Underlying disease</strong></td>
<td>73</td>
<td>43.2</td>
</tr>
<tr>
<td>Classification</td>
<td>Confirmed</td>
<td>Death</td>
</tr>
<tr>
<td>----------------</td>
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<td>-------</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>36</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>111</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>75</td>
<td>11</td>
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<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10~19y</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20~29y</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>30~39y</td>
<td>26</td>
<td>0</td>
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<tr>
<td>40~49y</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>50~59y</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>60~69y</td>
<td>34</td>
<td>9</td>
</tr>
<tr>
<td>70~79y</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>80y~</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>
## Clinical features of the cases

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Republic of Korea (as of July 31, 2015, n=186)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>93%</td>
</tr>
<tr>
<td>Chills or rigors</td>
<td>13%</td>
</tr>
<tr>
<td>Cough</td>
<td>40%</td>
</tr>
<tr>
<td>Headache</td>
<td>7%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>23%</td>
</tr>
<tr>
<td>Nausea</td>
<td>15%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>15%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>15%</td>
</tr>
<tr>
<td>Sore throat</td>
<td>1%</td>
</tr>
</tbody>
</table>
Summary (36 death cases)

- Female: 31%
- Male: 69%

- Caregiver: 24%
- Visitor: 8%
- Patient: 68%

- Underlying disease: 92%
- No underlying disease: 8%

Age distribution:
- 40-49 yrs: 4%
- 50-59 yrs: 16%
- 60-69 yrs: 36%
- 70-79 yrs: 32%
- >80 yrs: 12%
Average days from onset to confirmation (n=186)

Mean: 4.33 days (SD: 2.5 days)
Current findings

• The epidemiological pattern of the outbreak appears similar to hospital-associated outbreaks that have occurred in the Middle East

• There is no strong evidence at present to suggest that the virus has changed to make it more transmissible

• There is no evidence of ongoing community transmission
Main Risk Factors

• Lack of awareness among health care workers and the general public

• Suboptimal infection prevention and control measures in hospitals

• Close and prolonged contact of infected MERS patients in crowded emergency rooms and multibed rooms in hospitals
Main Risk Factors

- Doctor shopping (a patient visit multiple hospitals)
- The custom of many visitors or family members staying with infected patients
Action to control the MERS outbreak

• Early and complete identification of all contacts
• Quarantine or isolation and monitoring of all contacts and suspected cases
• Full implementation of infection, prevention and control measures
Action to control the MERS outbreak

• Prevention of travel, especially internationally, of infected persons and contacts
• Development of human resources and upgrading organization
• Risk communication
2. Public Health Response Against MERS in Korea
Timeline of MERS Control Measures

• First MERS case detected (May 20, 2015)
  - Contact tracing for persons who have close contacts with the patients (e.g., patients in the same room, care givers, health care workers)

• Central MERS Response TF at KCDC

• Strict case definition for contact tracing after confirmation of case #6
  – Expansion of contact tracing

• Central MERS Response TF at MOH
Strategy to contain the outbreak

• Revising the MERS response guideline
  – Case definition
  – Definition of close contact
  – Criteria of recovery
Case Definition for Detection

• Confirmed case
  - A person with laboratory confirmation of MERS-CoV infection

• Suspected case
  1. A patient who has fever and pneumonia/acute respiratory distress syndrome with clinical radiological evidence and
  - travel history to Middle East countries within 14 days before the onset of clinical symptoms, or
  - close contact history with a person who has a fever and acute respiratory illness after travelling to the Middle East Countries within 14 days
Case Definition for Detection

• Suspected case

2. A person with fever and respiratory illness (cough and respiratory distress syndrome) and travel history to the Middle East countries or who visited medical facilities as a healthcare worker, patient and visitor within 14 days

3. A person with fever or respiratory illness (cough, respiratory distress syndrome) patient who had close contact with a confirmed MERS-CoV case

4. Healthcare workers, patients and visitors with fever or respiratory illness who visited a hospital with MERS-CoV case within 14 days
Contact Tracing

• Listing of contacts
  – Casual contacts vs Close contacts

  * Casual contact: anyone who has visited a healthcare facility where a confirmed case was
treated or a person who was in the same household or hospital

  * Close contact: a person in contact with confirmed case not wearing personal protective
equipment, a person who was within a 2-meter distance, a person who had direct contact
with respiratory secretions, or passengers or cabin crew sitting around a confirmed or
suspected case
Contact Tracing

- Listing of contacts
  - Casual contacts vs Close contracts

- Contact management
  - **Casual contacts** will be daily monitored twice for fever and any illness without isolation for 14 days after last contact.
  - **Close contacts** will be daily monitored twice for fever and any illness with home or facility isolation for 14 days after last contact.
  - Health center agents visit contacts if contacts develop a fever of cough or shortness of breath.
  - With symptoms, casual contacts will be taken specimen and home isolated, while close contacts in facility isolation.
Definition of Close Contact

Dec 2014

• A person who has physical contact with confirmed or suspected case
  - Anyone who provided care for the patient, including a health care worker or family member
  - A person who stayed at the same place (family, roommate) while the case was symptomatic
  - Cabin crew and passengers sitting around a confirmed (suspected) case

June 7, 2015 (3rd revision)

• While not wearing proper PPE
  - A person who stayed within 2m distance
  - A person who stayed at the same place (family, roommate) and in the same hospital (healthcare worker, patients)
  - A person who has direct contact with respiratory secretions of patients
  - Cabin crew and passengers sitting around a confirmed (suspected) case
Control Measures in PHCs

- Epidemiological investigation on the suspected patients
  - Listing all the contacts
- Contacts management
  - Home isolation for the close contacts:
  - Facility isolation
  - Active fever or respiratory symptoms monitoring for all the contacts
  - In case of fever (37.5°C and above) or respiratory symptoms, the contact become a suspected case → collection of specimen and isolation of the patients in hospitals
Discharge & Releasing from Isolation

• Discharge Criteria
  • Recovered patients with two consecutive negative test results (24 hours apart) discharged from the hospitals.

• Releasing Criteria
  • Contacts with no symptoms for 14 days after the last contact will be released from isolation.
Quarantine situation

<table>
<thead>
<tr>
<th></th>
<th>In facility</th>
<th>Close contact (self isolation)</th>
<th>Under Active Monitoring</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quarantined</strong></td>
<td>874</td>
<td>4,650</td>
<td>3,088</td>
<td>8,612</td>
</tr>
<tr>
<td><strong>Released</strong></td>
<td>182</td>
<td>6,529</td>
<td>8,032</td>
<td>14,743</td>
</tr>
</tbody>
</table>

As of June 21, 2015
On 20 May
Raised alert level (attention to alert)
Strengthen the quarantine
(Self declaration to thermal screening system)

On 21 May
Following the identification of two additional cases.
Intensification of isolation measures for close contacts and 14 days- active monitoring were advised by The expert Committee on MERS CoV

On 22 May
The index case

On 26 May
With 4th case (Daughter of #3) and 2 suspected cases in HCW, KCDC revised the case definition of suspected cases by lowering temperature threshold from 38 C to 37.5 C

On 29 May
1 case exported to China was identified.
MERS Task Force Team was upgraded to the Ministry Level under the leadership of vice Minister.
The Pyeongtaek St. Mari’s hospital was closed.

On 31 May
The government-civil joint MERS task force co-chaired by the vice Minister of Health and Welfare and the president of Korean Society of Infectious Diseases was established

1 June
Travel ban of close contacts were introduced

5 June
MOHW announced the joint mission on MERS-CoV with WHO

6 June
Active monitoring of casual contacts was initiated

7 June
MOHW decided to disclose the name of hospitals which MERS cases have occurred and visited before the diagnosis

9 June
MOHW designated 236 hospitals as triage healthcare facilities for MERS-CoV suspected cases

10 June
Nationwide cross sectional pneumonia survey was conducted

On 12 June
Travel ban for casual contacts was lifted

14 June
Following additional hospital staff case (#137) in SMC, partial closure of SMC was announced
Enhancing Control Measures

- Contact information sharing with health care workers
  - Web-based database of contacts using Health Insurance and Assessment Service
- Enhancing severe pneumonia surveillance among hospitals with ICU ($n = 262$) in 4 provinces since June 7
- A cross-sectional nationwide survey of clinical pneumonia (June 15-16)
  - 7,468 pneumonia cases reported from 2,575 hospitals
  - One of 14 tested was positive
- Distribution of PPEs to PHCs and hospitals
- Departure ban of contacts
- Strengthening of lab capacity in public and private sectors
A remark on MERS in Korea

“Our current assessment of the MERS situation in this country is, the government is now on a very good footing. The response of the health authority has been exemplary.

You may say that at the beginning, it was a slow start. But that slow start was followed by world-class epidemiological detective work.

The country’s highly-developed IT capabilities allowed real-time tracking of spread and reporting of findings.

The response in this country has been strengthened, very quickly, systematically, and very significantly. And I can say, very few other countries in the world can do this.

Going forward, I think implementation of stronger contact tracing, monitoring, and quarantine measures, followed by, and we are already seeing a decline in new cases, suggests that the control measures put in place by the government are taking effect.”

Dr. Margaret Chan, Director General, WHO

June 18, 2015
3. Risk Communication
Information Sharing and communication with Public

- Press release since May 20
- Daily press briefing since May 29
- Hot-line establishment, May 30
- Disclose the list of all hospitals, June 7
- Establishment of MERS-CoV portal, June 10
- Daily press release in English, June 10
- Press briefing on ROK-WHO joint mission, June 13

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<tbody>
<tr>
<td>May 20</td>
<td>May 29</td>
<td>May 30</td>
<td>June 7</td>
<td>June 10</td>
<td>June 13</td>
</tr>
</tbody>
</table>
MERS-CoV Portal
www.mers.go.kr/mobile: m.mers.go.kr (since June 10)
Hotline for MERS-CoV

~ Provided in 19 Languages
~ Number:
  (Central) 109
  (Local) Area code + 120

<table>
<thead>
<tr>
<th>Date</th>
<th>Total</th>
<th>129* From MoHW</th>
<th>Hotline Korean</th>
<th>Foreign Languages</th>
<th>Call Center</th>
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</tr>
</thead>
<tbody>
<tr>
<td>20 June</td>
<td>6,928</td>
<td>486</td>
<td>3,383** (38)</td>
<td>English 15</td>
<td>1,252</td>
<td>1,792</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chinese 3</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td>Japanese 4</td>
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<td></td>
<td></td>
<td></td>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Until 19 June</td>
<td>193,596</td>
<td>14,265</td>
<td>94,431** (685)</td>
<td></td>
<td>26,097</td>
<td>56,269</td>
</tr>
<tr>
<td>Total</td>
<td>200,524</td>
<td>14,751</td>
<td>97,814** (723)</td>
<td></td>
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</tbody>
</table>

*Until 19 June

Provided in 19 Languages
Number:
(Central) 109
(Local) Area code + 120
**Mode of Communication**

- Updated information is providing by **daily briefing** and **news release** as needed.
- Major news release was translated in **English** and available for population from foreign countries.
- Communication is ongoing **via SNS** such as Facebook, Twitter, and Blogs.
- Broadcasting campaigns/Cartoons/Leaflets/Electronic signs are available.
Guidelines

Guideline to take care of a suspected case for hospital/ Clinic

Guideline for ‘home quarantine’
Information available in different languages
International Collaboration

- **Main communication channel** with international society is International Health Regulation (IHR, 2005).
  - Report confirmed cases and deaths to WHO/WPRO
  - Respond inquiries from other countries
  - For urgent issue, in case of notifying travel of close contacts, notify counterpart country using IHR National Focal Point channel

- **Information sharing among China, Japan, and Korea**
  - Notify Case #10’s departure to China, May 27
  - Share daily outbreak status information

- **Briefing for foreign embassies in Korea, June 8**
International Collaboration

• ROK-WHO joint mission, June 8-13
  - The mission concluded that while the outbreak that began last month has been large and complex, it is showing a similar epidemiological pattern to previous hospital-associated MERS-CoV outbreaks in the Middle East, which have been fully controlled by strong basic public health measures such as infection prevention and control.

• ROK-Saudi Arabia joint workshop, June 12
  - Experience sharing of controlling MERS-CoV outbreaks

• ROK-US CDC collaboration, June 22~
Thank you for your attention!