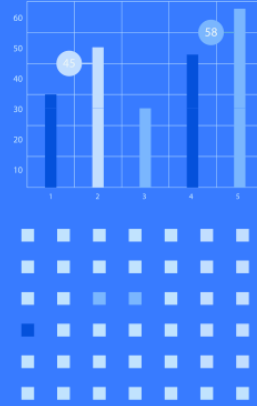
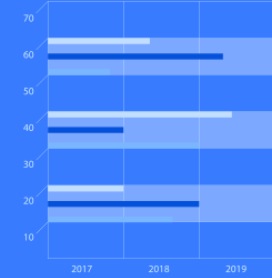
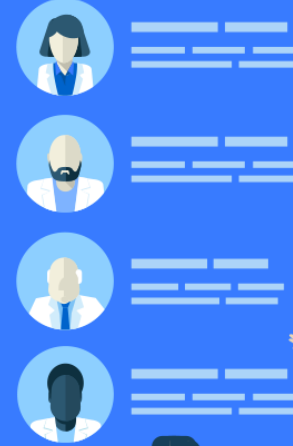
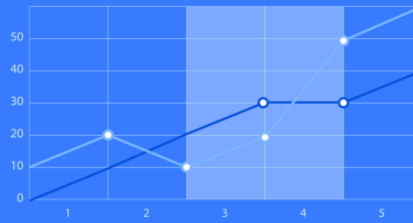


Department of Resource Recycling,
Korea Environment Corporation

Medical Waste Management in Korea's COVID-19 Response

June 5, 2020
Jun-ho Kim,
RFID Operations Team



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Medical Waste Management in Korea's COVID-19 Response

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Response

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1. Introduction to K-eco

For the affluent world where mankind live together with the nature and the sustainable future where today meets tomorrow, K-eco will open the green future by performing its role faithfully as the global environmental keeper under the Korean government.

MISSION Contribution to the development of eco-friendly nation by improving environment and promoting resource circulation

VISION The coexistence of nature and human;
Future with our environmental expertise

| | |
|----------------------------|---|
| Legal basis | The K-eco Act (Law No. 11446) |
| Type of institution | A consigned enforcement-typed quasi-government agency |
| Umbrella body | Ministry of Environment |
| Organization | 5 Headquarters, 6 Regional Headquarters |
| Number of persons | About 3,058 staff members / environmental experts |

Closer to Nature, Closer to People



01. Overview of Korea's Medical Waste Management

Classification and Management of Medical Wastes

| Waste Type | | Storage Facility | Container Type and Color Scheme | Storage Period |
|------------------------------|-------------------------|---|---|--|
| Medical Waste for Quarantine | | Refrigerated storage/transportation | Plastic container (red) | Discharge: 7 days Transportation and incineration: 2 days each |
| Hazardous Medical Waste | Tissues | Refrigerated storage/transportation | Plastic container (yellow) | Discharge: 15 days (60 days for teeth) Transportation: 5 days, processing: 2 days |
| | Placentas for Recycling | Refrigerated storage/transportation | Plastic container (green) | Discharge: 15 days Recycling: 5 to 7 days |
| | Injurious | Room temperature storage, refrigerated transportation | Plastic container (yellow) | Discharge: 30 days Transportation and incineration: 5 days each |
| | Pathological | Room temperature storage, refrigerated transportation | Liquid: Plastic Solid: Corrugated cardboard (yellow) | Discharge: 15 days Transportation and incineration: 5 days each |
| | Biochemical | Room temperature storage, refrigerated transportation | Liquid: Plastic Solid: Corrugated cardboard (yellow) | Discharge: 15 days Transportation and incineration: 5 days each |
| | Blood-contaminated | Room temperature storage, refrigerated transportation | Liquid: Plastic Solid: Corrugated cardboard (yellow) | Discharge: 15 days Transportation and incineration: 5 days each |
| General Medical Waste | | Room temperature storage, refrigerated transportation | Liquid: Plastic Solid: Corrugated cardboard (yellow) | Discharge: 15 days (30 days if refrigerated) Transportation and incineration: 5 days each |

※ Storage periods specified for transporters apply only to storage in authorized temporary storage facilities prior to transshipment

01. Overview of Korea's Medical Waste Management

✓ Radio-frequency Identification (RFID)

- A technology which uses radio frequencies to read data from a distance. This is a next-generation information communications technology which stores different types of data in an IC chip built into an RFID tag for real-time, wireless transfer.
- The components involved are RFID tags, RFID readers (fixed or portable), and tag issuers



Fixed reader



Portable reader



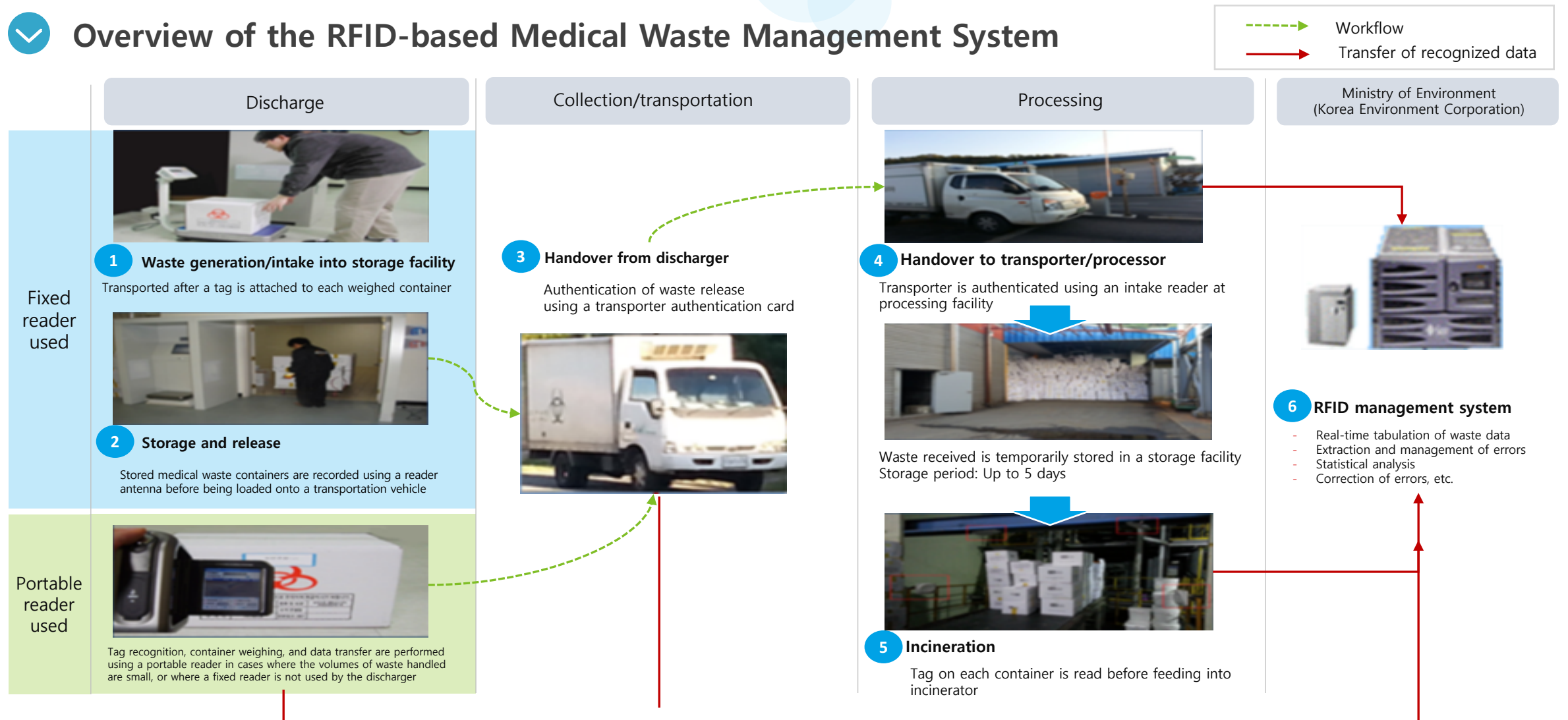
Fixed reader antenna



Electronic tag

01. Overview of Korea's Medical Waste Management

Overview of the RFID-based Medical Waste Management System



Storage facility intake/release at discharge stage; transportation after handover from discharger

01. Overview of Korea's Medical Waste Management

✓ Discharge, Transportation, and Processing of Medical Waste



Discharge from hospital rooms



Input of discharge history



Temporary storage in discharger's storage facility

- 1. Registration of discharge history
- 2. Management of intake history at processing facility
- 3. Management of incineration history



Incineration



Intake at processing facility



Collection/transportation

02. Overview of Special Management of COVID-19 Medical Waste

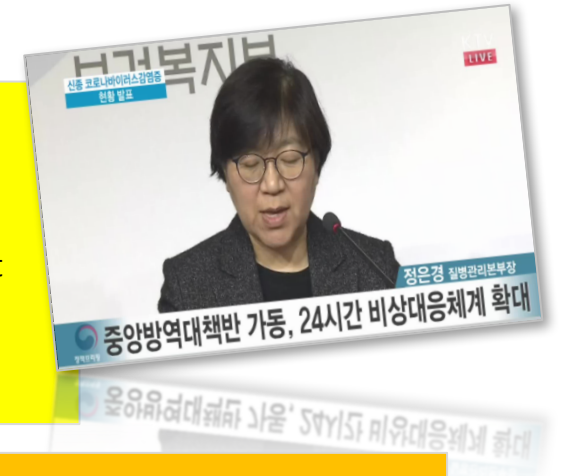
Overview of the COVID-19 Pandemic

◇ Confirmed case detected in airport quarantine by Korea Centers for Disease Control and Prevention (Jan. 20)

- Contagious disease alert level elevated to **"caution"**
 - * Thirty-five-year-old Chinese female transported to a government-designated medical facility for isolation treatment

◇ Detection of second confirmed case (Jan. 24)

- Korean male entering Korea from China identified in quarantine inspection at Gimpo Airport on Jan. 22
 - * Twenty-five individuals with symptoms tested but confirmed **negative**



◇ Detection of fourth confirmed case (Jan. 27)

- Contagious disease alert level elevated to **"warning"**
 - * Central Disaster Management Headquarters for COVID-19 Response activated
 - 288 medical facilities designated for screening clinic operation; Guideline for Citizen Response issued to the public (Jan. 28)

◇ Contagious disease alert level elevated to **"serious"** (Feb. 23)

- Response to community transmission in and around the Gyeongsangbuk-do region (Daegu)
 - * The Central Disaster and Safety Countermeasures Headquarters, headed by the Prime Minister, was formed to enable a pan-governmental response
 - Confirmed cases: 556, tested: 22,077



02. Overview of Special Management of COVID-19 Medical Waste

- ✓ Formation of Policy on the Special Management of Medical Waste by the Ministry of Environment (executed Jan. 30, 2020)

Goal: To fundamentally prevent secondary infection in the process of discharge, transportation, and processing of medical waste, and ensure the safe processing of medical waste

Government-designated hospitals, etc.

- ◇ Discharge: Sterilized before/after placement in a special container, refrigerated storage, processed by a service provider on the same day (minimization of in-hospital storage)
- ◇ Transportation: No temporary storage, same-day transportation, disinfection of inside/outside of transportation vehicles
- ◇ Incineration: Incinerated on the day of intake

Isolation facilities, etc.

- ◇ Discharge: Placed outside door in a special container (sterilized before placement in container)
- ◇ Transportation: No temporary storage, same-day transportation, disinfection of inside/outside of transportation vehicles
- ◇ Incineration: Incinerated on the day of intake

Self-isolation at home

- ◇ **No symptoms**: Refrain from discharge where possible; discharge medical waste in special bags; discharge household waste seal-packaged in standard garbage bags (**processed as household waste**)
- ◇ **Symptoms present**: Discharge waste double-seal-packaged for collection in a special container by a collection service provider (**same-day transportation and incineration of medical waste**)
- ◇ **Confirmed patients**: Waste placed in a special container and stored until patient is transported to a hospital
* Self-isolation due to a shortage of hospital facilities

02. Overview of Special Management of COVID-19 Medical Waste

Medical Waste Management and Processing Manual for Specially Managed Facilities

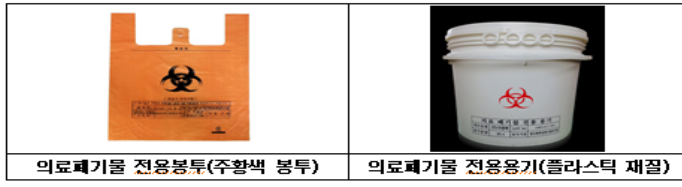
붙임3 생활치료센터 폐기물 관리·처리 매뉴얼

[폐기물 처리에 필요한 물품]

- 폐기물 처리에 필요한 물품은 ①폐기물 소독제 ②의료폐기물 전용봉투(주황색 봉투) ③의료폐기물 전용용기(플라스틱 재질) ④의료폐기물 전용용기(골판지류)입니다.

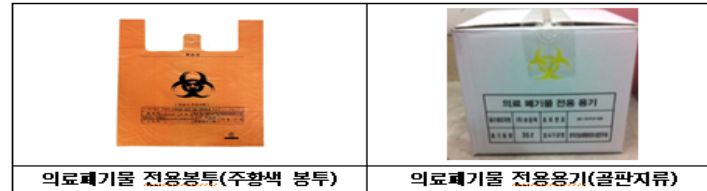
[생활치료센터 격리자 발생 폐기물 배출방법] - 격리의료폐기물

- 격리실에서 발생하는 모든 쓰레기는 분리배출 필요 없이 제공되는 전용봉투(주황색 봉투)에 담기 전 전용봉투 내부를 1차 소독, 폐기물을 담은 후 2차 소독하여 반드시 내용물이 보이지 않게 묶어주시고,
- 제공되는 의료폐기물 전용용기(플라스틱 재질)에 전용봉투(주황색 봉투)를 넣고, 전용용기(플라스틱 재질)의 뚜껑을 닫기 전 소독 후, 뚜껑을 단단히 밀폐하여 주시기 바랍니다.
- 밀폐된 의료폐기물 전용용기(플라스틱 재질)은 격리실 문 앞에 배출하기 전 외부 전체를 1회 더 소독하여 배출하여 주시기 바랍니다.
- 폐기물은 의료폐기물 전용용기(플라스틱 재질)의 뚜껑이 완전히 닫힌 후 배출되어야 수거가 가능합니다.
- 배출된 폐기물은 매일 수거자가 수거하여 '생활치료센터' 내 별도(일시)보관장소에 보관하여야 합니다.



[생활치료센터 운영인력 등 발생 폐기물 처리방법] - 일반의료폐기물

- 운영인력 사용공간 및 숙소 등 발생 폐기물, 확진자와 직접 접촉하지 않은 폐기물(도시락 및 구호물품 박스 등)은 일반의료폐기물로 처리하며,
- 분리배출 없이 의료폐기물 전용봉투(주황색 봉투)에 넣고 밀봉하기 전 소독을 진행해야 합니다.
- 소독 후 내용물이 보이지 않도록 전용봉투(주황색 봉투)를 묶은 후, 의료폐기물 전용용기(골판지류)에 넣어 밀봉해야 합니다.
- 밀봉한 의료폐기물 전용용기(골판지류)는 수거 전 외부 전체를 1회 더 소독하여 배출하여야 합니다.
- 배출된 폐기물은 매일 수거자가 수거하여 '생활치료센터' 내 별도(일시)보관장소에 보관하여야 합니다.



[생활치료센터 내 폐기물 일시보관 및 운반·소각 처리방법]

- 별도(일시)보관장소는 1회/일 소독을 하여야 하며, 필요시 추가 소독을 진행할 수 있습니다.
- 별도(일시)보관장소에 보관하는 의료폐기물은 매일 의료폐기물 처리업체(수집·운반, 소각)에서 운반 및 소각처리를 진행하여야 합니다.

붙임4 자가격리자 생활폐기물 관리·처리 매뉴얼

① '코로나19' 의심증상이 발생하지 않을 때 생활폐기물의 배출요령

가정에서 발생하는 생활폐기물(음식물쓰레기 포함)은 제공되는 전용봉투에 담아서 소독제로 쓰레기통 상부와 봉투 외부를 충분히 소독하여 보관하여 주시기 바랍니다. 1일 1회 이상 소독하여 주시기 권장 드립니다.

전용봉투는 밀폐 포장이 가능하도록 체적의 75% 미만으로 담도록 하며, 다 사용하신 봉투는 소독제로 충분히 소독 후 밀폐되도록 묶어 별도의 보관장소에 모아 보관하시고 1일 1회 이상 소독하시기를 당부 드립니다.

전용봉투에 담긴 폐기물의 외부로의 배출을 자제하되, 불가피하게 전용봉투에 담긴 폐기물을 배출하여야 할 때에는 봉투를 끌고루 소독한 후 다시 한번 폐기물 중량제 봉투에 넣어 관할 보건소 담당자에게 연락하시면 수거, 처리될 수 있도록 하고 있습니다.

전용봉투가 제공되기 전까지는 전용봉투를 대신하여 중량제 봉투를 사용하여 담고, 배출할 때는 다시 한번 중량제 봉투에 담아 배출해 주시기를 당부드립니다.

② '코로나19' 의심증상이 나타날 때 생활폐기물 배출요령

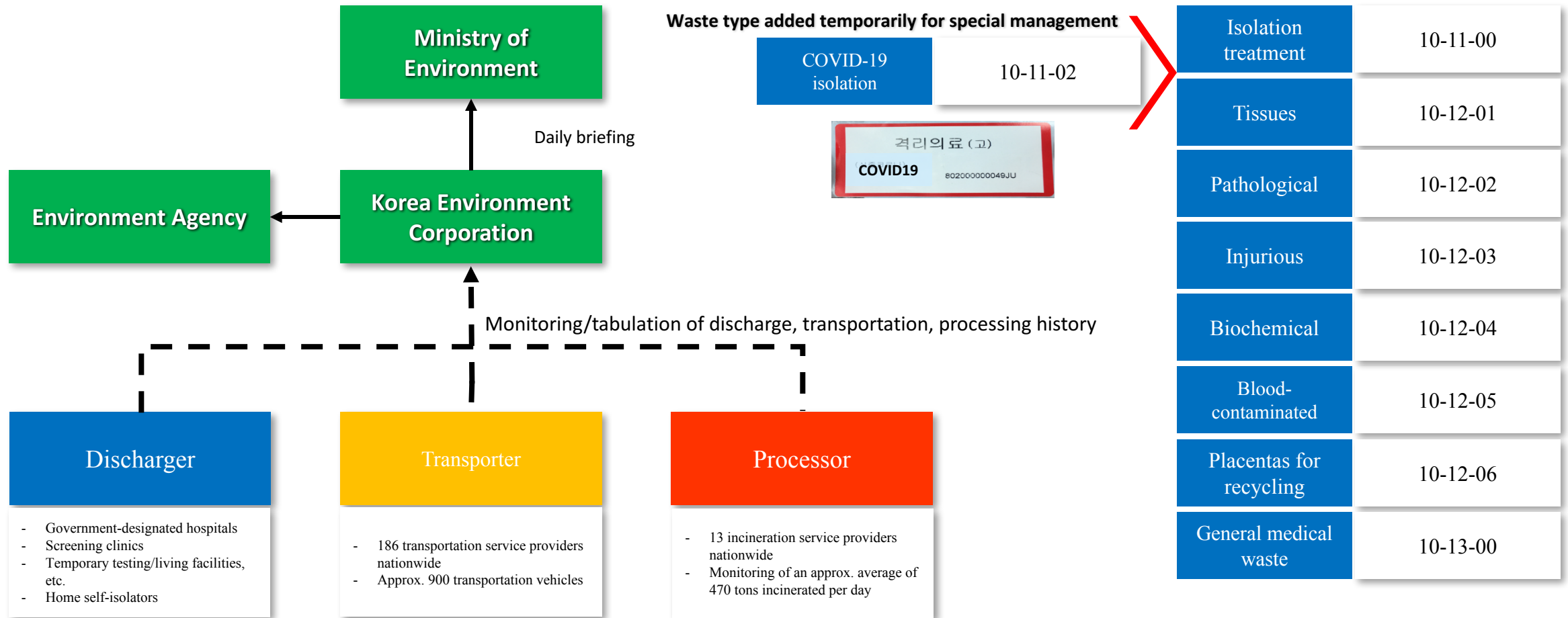
일단 신종 코로나바이러스 증상이 의심될 때에는 보건당국에게 즉시 연락하시고, ①과 같이 전용봉투에 담아 보관해 주시기 바랍니다. 보건당국과 전문 처리업체가 무상으로 수거하여 안전하게 처리할 예정입니다.

③ '코로나19' 확진 후 자가격리된 경우 폐기물 배출요령

①과 같이 전용봉투에 담은 후 병원 이송 전까지 제공된 합성수지 전용용기에 투입하여 보관해주시기 바랍니다. 이송 후 보건당국과 전문 처리업체가 무상으로 수거하여 안전하게 처리할 예정입니다.

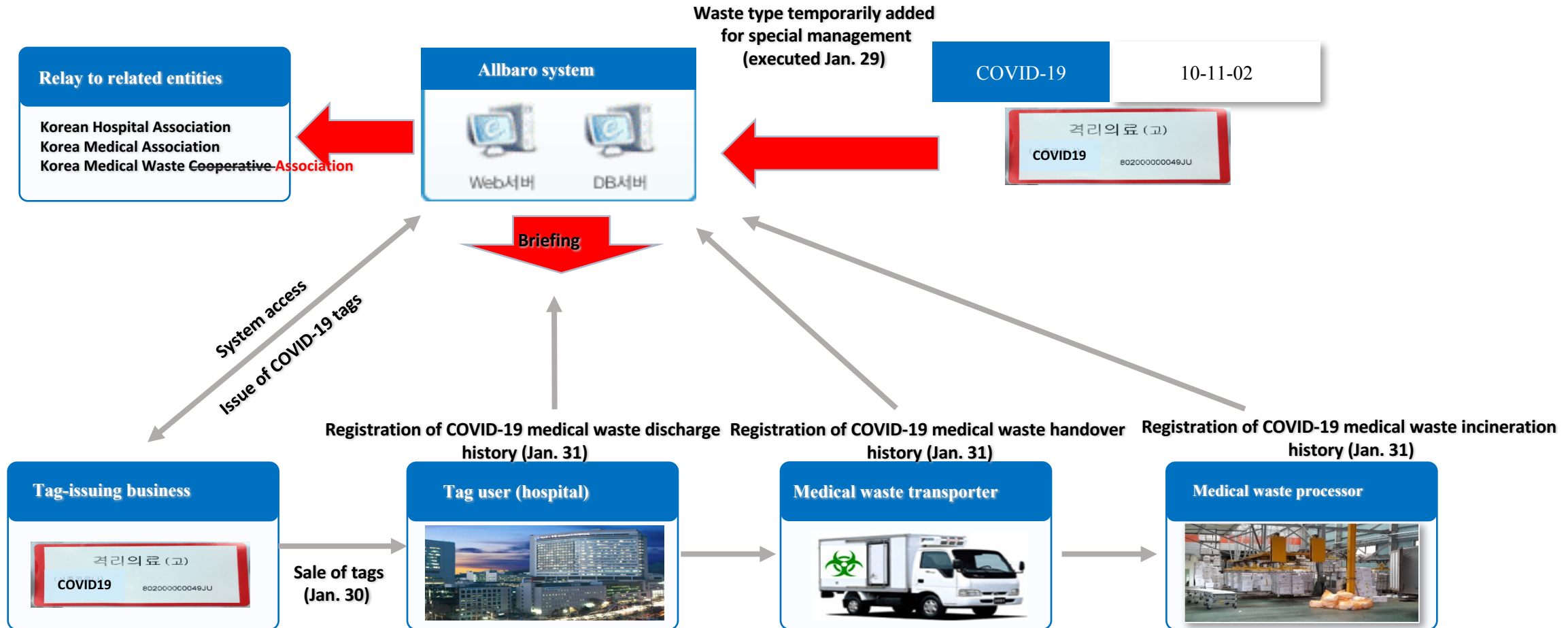
03. Korea Environment Corporation's Role and Efforts in the COVID-19 Response

Operation of the COVID-19 Medical Waste Management Briefing Room



03. Korea Environment Corporation's Role and Efforts in the COVID-19 Response

- Networking of Related Entities for the COVID-19 Special Management Code (approx. 2 days required for activation after system application)



03. Korea Environment Corporation's Role and Efforts in the COVID-19 Response



Monitoring and Daily Reporting of COVID-19 Medical Waste Generation at Special Management Facilities

[Unit: 1 location, kg]

| As of May 18 | Discharging hospitals | Volume generated | Volume transported | Volume incinerated |
|--------------|-----------------------|------------------|--------------------|--------------------|
| Total amount | 417 | 2,190,647 | 2,190,647 | 2,180,352 |
| COVID-19 | 404 | 1,868,498 | 1,868,498 | 1,860,399 |
| Misc. | 40 | 322,149 | 322,149 | 319,953 |
| Daily amount | 94 | 13,004 | 13,004 | 7,441 |
| COVID-19 | 89 | 11,507 | 11,507 | 6,260 |
| Misc. | 5 | 1,497 | 1,497 | 1,182 |

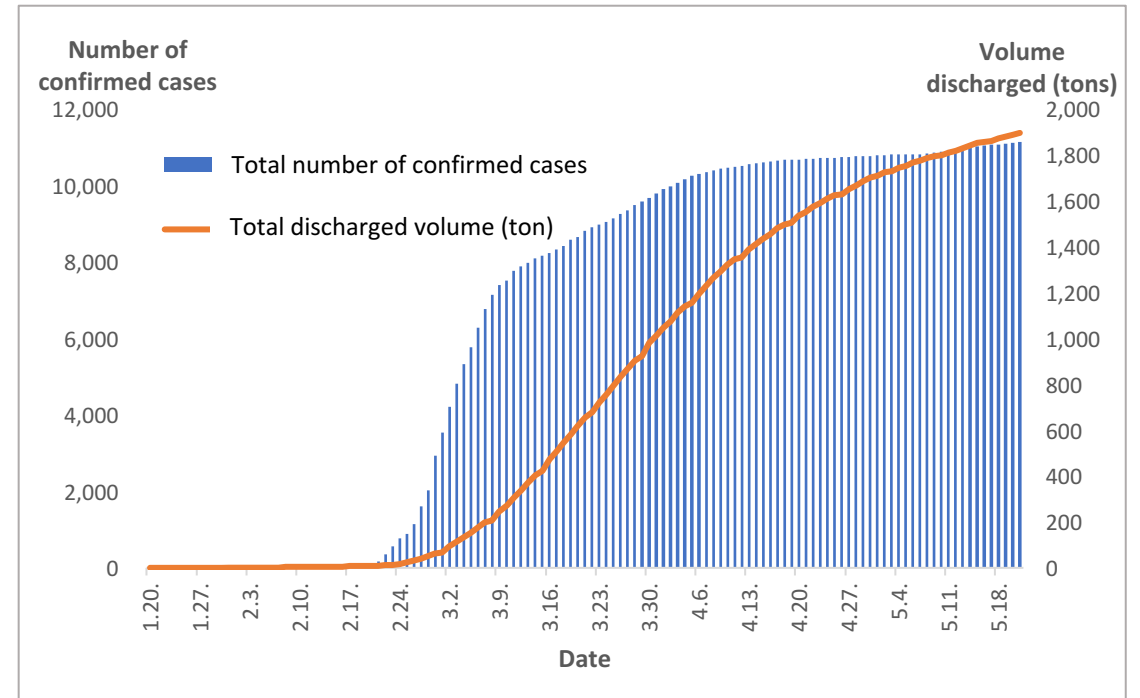
| Government-designated hospitals, etc. |
|---|
| <ul style="list-style-type: none"> - Patient treatment hospitals: 195 - Screening clinics: 151 - Testing bodies: 8 - Airport quarantine stations: 1 |

| Community treatment centers |
|--|
| <ul style="list-style-type: none"> - Government-designated: 15 - Local government-designated: 16 |

| Temporary living facilities |
|--|
| <ul style="list-style-type: none"> - Temporary testing: 16 - Living facilities for short-stay foreigners: 15 |

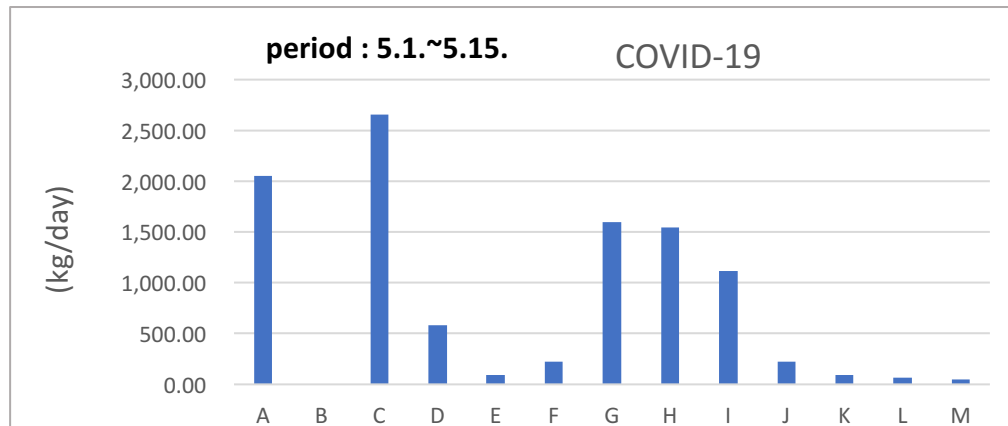
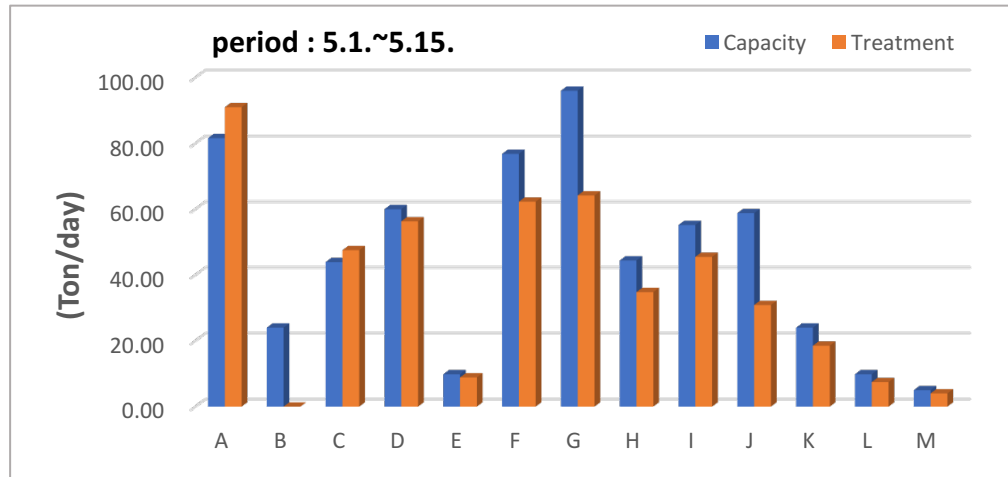


Total Number of Confirmed Cases and Rate of COVID-19 Medical Waste Generation

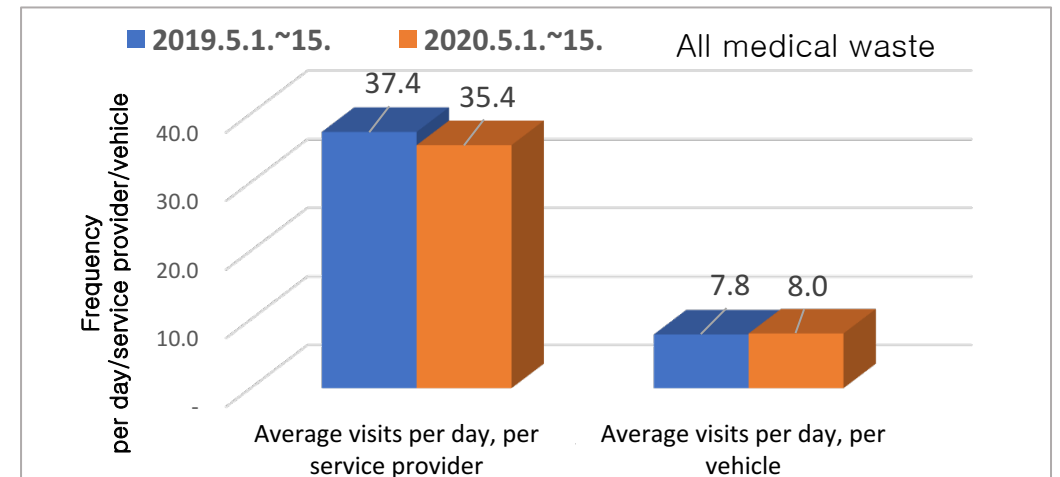
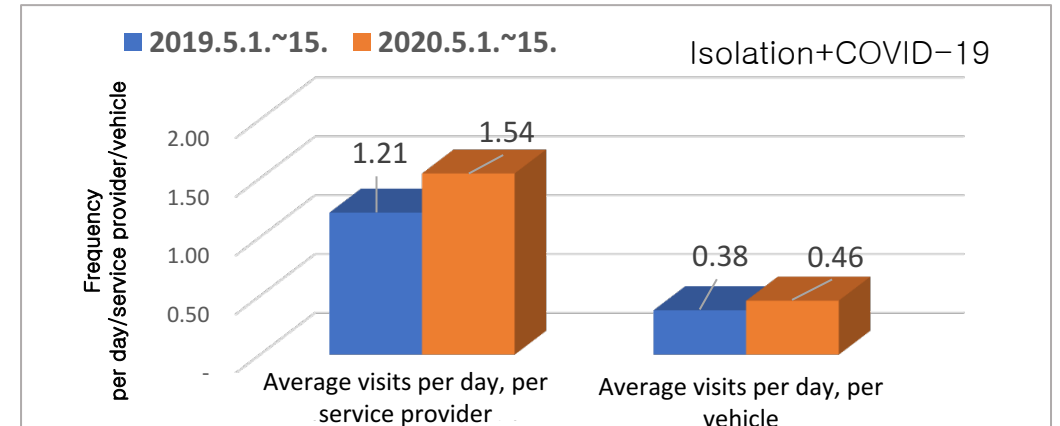


03. Korea Environment Corporation's Role and Efforts in the COVID-19 Response

Overview of Incineration at Medical Waste Incineration Facilities

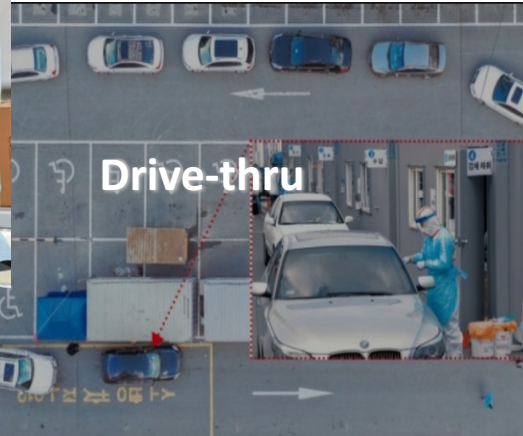


Overview of Change in the Intensity of Work Performed by Transportation Service Providers



04. Korea's Special Facilities for COVID-19 Response

✔ Prompt setup of a total-inspection system

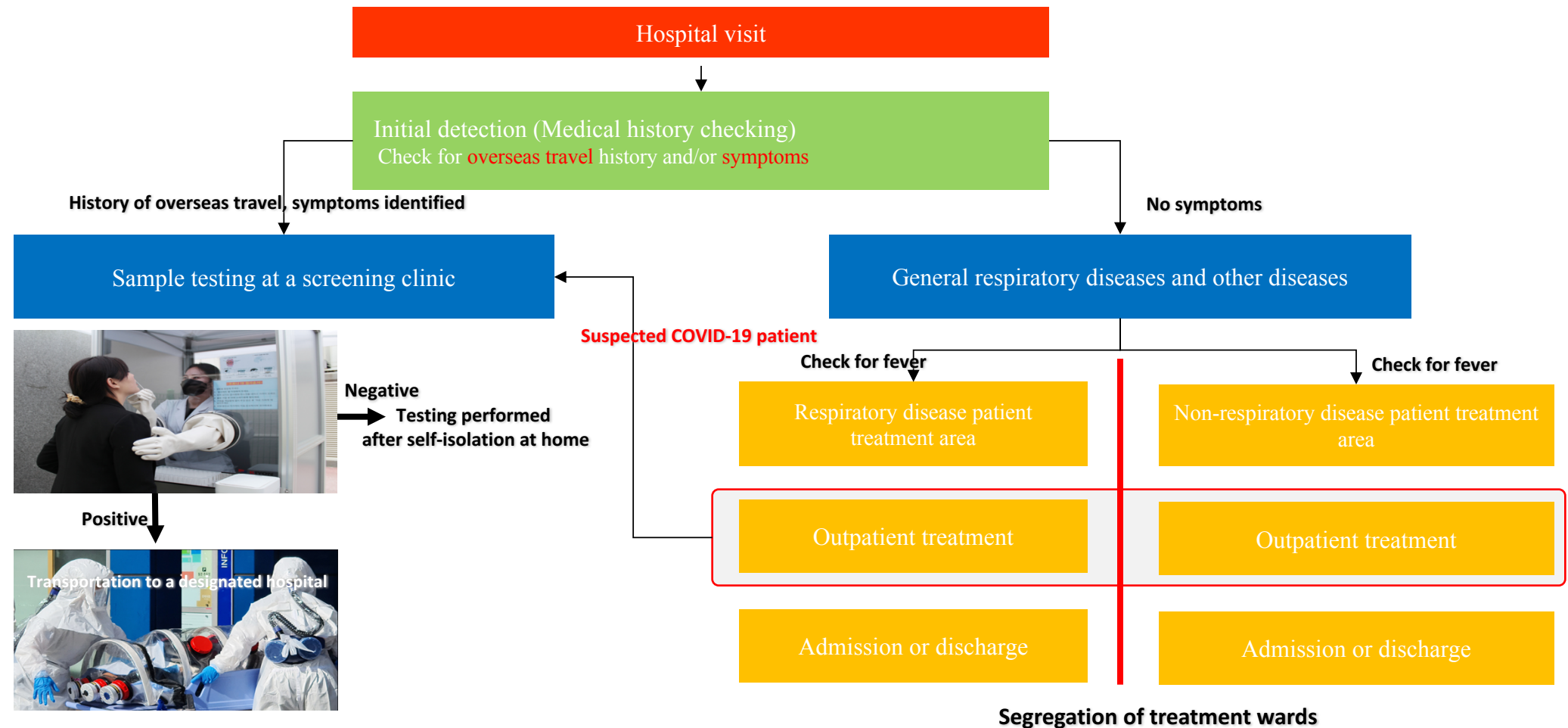


✔ Designation of "public relief hospitals"



04. Korea's Special Facilities for COVID-19 Response

- ✓ Purpose: To guarantee safe medical treatment to everyone, even during the COVID-19 pandemic



04. Korea's Special Facilities for COVID-19 Response

✓ Facilities for the Management of Confirmed COVID-19 Patients, Koreans Returning from Overseas, and Foreign Nationals Entering Korea

Types of Facilities

Community treatment centers

Purpose: Treatment of patients with mild cases of COVID-19
Personnel: Dispatched medical personnel and support staff
Discharge after confirmation of full recovery
•Temporary treatment facility to make up for shortage of hospital facilities

Temporary living facilities

Purpose: Support self-isolation by Koreans returning from abroad and foreign nationals entering Korea
Personnel: Staff for living support and a minimum number of medical personnel (4 to 5)
Discharge after 14 days of self-isolation at facility

Temporary testing facilities

Purpose: Temporary residence for persons entering Korea from overseas for confirmation of COVID-19 test results
Personnel: Staff for living support and a minimal number of medical personnel (4 to 5)
Discharge after confirmation of test results
* Self-isolation or admission to a temporary living facility

* Training centers of **public institutes** or **large enterprises** and privately owned **hotels** are temporarily used (use of privately owned hotels subsidized by the government)

04. Korea's Special Facilities for COVID-19 Response

Community treatment centers

Temporary testing and living facilities for persons entering Korea from overseas



04. Korea's Special Facilities for COVID-19 Response

Supplies for Persons Admitted to Temporary Living Facilities, and Self-isolators



Supplies for self-isolators (special bags for disposal of waste including food waste)



Disinfection of the inside of living facilities (before/after use)



Supplies provided to all persons admitted (special bags for disposal of medical waste, disinfectant, etc.)

Request for supplies (water, shaving kit, coffee, etc.)

신문 X 임상증상 기록지 (323)호

| 증상 | 1일 | 2일 | 3일 | 4일 | 5일 | 6일 | 7일 | 8일 | 9일 | 10일 |
|-------------|----|----|----|----|----|----|----|----|----|-----|
| ① 기침 | X | X | X | X | X | X | X | X | X | X |
| ② 인후통 | X | X | X | X | X | X | X | X | X | X |
| ③ 호흡곤란 | X | X | X | X | X | X | X | X | X | X |
| ④ 객담 | X | X | X | X | X | X | X | X | X | X |
| ⑤ 기타 (열사 등) | X | X | X | X | X | X | X | X | X | X |

신문 사절
생수 수제간
숙제서
키누커피
남은거 갖는거
수영수 갖는거

Clinical log for health check

04. Korea's Special Facilities for COVID-19 Response

✓ Distribution of Guidelines on the Discharge of Waste by Persons Admitted to Special Management Facilities

< Korean >

입시설명시설 폐기물 배출 재공지

□ 수칙

- 객실 내 배출되는 모든 폐기물은 반드시 밀봉된 박스로 배출
 - (배출시간) 매일 오전 9시 30분까지
 - (배출장소) 각 객실 문앞
- ※ 절대 분리수거 하지 않습니다.

□ 배출방법 재공지

- ① 지급된 테이프와 가위를 활용하여 박스 만들기
- ② 폐기물을 주황색 봉투에 담기
- ③ 봉투 밀봉 전 소독 스프레이 뿌리고 박스에 담기
- ④ 테이프로 박스 밀봉 후 문 밖으로 배출

※ 추가 박스와 폐기물봉투는 2.14(목)에 지급예정

○ 사진 설명

| | | |
|--|--|----------------------|
| | | |
| | | 테이프로 밀봉 후 방문 앞 배출 |

※ 박스에 밀봉되지 않은 폐기물은 수거되지 않습니다.

< English >

How to dispose waste in the facility
(Ministry of Environment Corona 19 Support Group(Cheonan Bangnok Resort) '20.04.04)

□ How to use waste box

- ① Paper box, scissors, tape, and disinfectant are placed near the door
- ②~③ Fold the paper box and seal the bottom of the box with tape
- ④~⑥ Open the plastic bag and put it in the box, then spray with disinfectant.
- ⑦~⑧ Put wastes in the plastic bag
- ⑨~⑩ (When disposed) Please seal the bag (spray disinfectant again)
- ⑪~⑬ Close the paper box and seal the top of the box with tape

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| | | | Leave it outside the door |

< Chinese >

如何处理设施中的废物(중국어)

□ 垃圾箱的使用方法

- ① 將紙箱、剪刀、膠帶和消毒劑放在門附近
- ②~③ 折疊紙盒，并用膠帶密封紙盒底部
- ④~⑥ 打開塑料袋，放入包裝盒，然後噴洒消毒劑。
- ⑦~⑧ 將廢物放入塑料袋中
- ⑨~⑩ (廢棄時) 請密封包裝袋 (再次噴洒消毒劑)
- ⑪~⑬ 關閉紙盒并用膠帶密封紙盒的頂部

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| | | | |
| | | | |
| | | | 放在门外 |

* Also provided in German, French, Spanish, and Japanese

04. Korea's Special Facilities for COVID-19 Response

- ✓ Processing of Medical Waste Discharged from Facilities (contact-free collection and safe processing)







On-site Post-management of Medical Waste Improvement Activities in Paraguay

✓ **Background:** Selected as a follow-up project related to a global training program recognized as meritorious by Korea International Cooperation Agency

✓ Project Outline

- ▶PROJECT NAME: ON-SITE POST-MANAGEMENT OF MEDICAL WASTE IMPROVEMENT ACTIVITIES IN PARAGUAY
- ▶OBJECTIVE: PRESENTATION OF GUIDELINES ON EFFECTIVE MANAGEMENT OF MEDICAL WASTE FOR ACHIEVING A SAFE LIVING ENVIRONMENT THROUGH THE PREVENTION OF SPREAD OF SECONDARY INFECTION
- ▶PROJECT DURATION: OCT. 2019 TO JUN. 2020 (9 MONTHS)
- ▶BUDGET: KRW60.5 MILLION

✓ Notable Achievements

-  Dispatched domestic/international experts for inspection of medical waste management conditions at Paraguayan hospitals
 - Site inspection of classification, storage, transportation, processing, and incineration
-  Trial executed at Hospital Distrital Mariano Roque Alonso
 - Creation of guidelines on temporary waste storage facility improvement and medical waste management
-  Workshop to improve the capacity of government (Paraguayan Ministry of Environment) and hospital employees
 - Waste management improvement training, including a study of cases of medical waste management at Korean hospitals
-  Creation of a "project concept paper" (PCP) aimed at improvement in the field of health and environment in Paraguay

▶ Site inspection at San Pablo Hospital



▶ Medical waste management coaching (identifying issues and making improvements)



▶ Medical waste management capacity enhancement workshop



▶ International cooperation in COVID-19 waste management

코로나바이러스감염증-19 관련
폐기물 관리·처리

2020. 3. 2.

Korean

 환경부

* 해당 자료는 2020년 3월 2일 환경부에서 작성한 「코로나바이러스감염증-19 관련 폐기물 안전관리 지침」에 관한, 예시 폐기물관리 처리 부분을 일괄하여 사용함.

Gestión de residuos relacionados con
la infección por COVID-19

2020. 3. 2.

Spanish

* Este documento es un extracto de la sección de gestión y eliminación de residuos de la "Guía técnica operativa de gestión de la seguridad de los desechos relacionados con la infección por el virus Corona, nueva epidemia, preparada por el Ministerio de Salud, Asunción (2020) 20 de marzo."



Korea's Medical Waste Management for
COVID-19 Response

Thank you.

Korea Environment Corporation
RFID Operations Team,
Department of Resource Recycling