Operation and Management Guidelines for Nationally-Designated Inpatient Beds

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The Ministry of Health and Welfare

The Korea Centers for Disease Control and Prevention

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** Translator's note: Part 3 has not been translated.*

PART I

Introduction and Features of Nationally-Designated Inpatient Beds Responding to Emerging Infectious Diseases

Chapter 1. Overview

I. Background

1. Purpose of the Installation and Operation of Nationally-Designated Inpatient Beds

- Responding in case of patients with Severe Acute Respiratory Syndrome(SARS), Animal Influenza in humans, Pandemic Influenza(PI), Middle East Respiratory Syndrome(MERS), Emerging Infectious Disease Syndrome, and Infectious Diseases spread through Bioterrorism.
- An Infectious Disease Control Institutions equipped with Infectious Disease Control Facilities for preventing infection, such as negative pressure facilities and proper decontamination spaces, to curb secondary infections in hospitals, secure the safety of healthcare providers, and prevent spread to local communities

2. Legal Basis

- *Infectious Disease Control and Prevention Act of Republic of Korea* Article 36[1] and 37
- *Regulations on the Operation of Nationally-Designated Inpatient Beds* (Korea Centers for Disease Control and Prevention (KCDC) Rules, Subparagraph 299)

3. Definition of Terminologies

- “Nationally-designated inpatient beds” (hereafter “inpatient beds”) is an infectious disease management facility established and operated with the support of the Director of the KCDC to isolate and provide inpatient care for patients with emerging infectious disease and the likes,” under “ordinary times” or “national public health emergency”
- According to the crisis alert levels defined by the standard manual for the infectious diseases crisis management, the “ordinary times” refers to the level blue; the “national public health emergency” refers to all levels of yellow, orange, and red
- “Patients with infectious diseases and the likes” refers to those that the head of the KCDC determines as requiring inpatient treatment among confirmed and suspected cases, carriers, and any persons who have been in contact with them.
- The “Healthcare facility that operates nationally-designated inpatient beds” (hereafter “healthcare facility”) refers to the Infectious Disease Control Institutions that establish and operate nationally-designated inpatient beds

[1] *Infectious Disease Control and Prevention Act of Republic of Korea* Article 36, (Designation of the Infectious Disease Control Institutions, etc.) ① The Governor of a municipality or the head of city/county/district can designate a Healthcare facility under the *Medical Service Act* as an Infectious Disease Control Institution, as prescribed by the Ordinance of the Ministry of Health and Welfare. ② The head of a Healthcare facility designated pursuant to paragraph 1 (Referred to as "Infectious Disease Control Institutions") has to establish facilities for preventing infectious diseases and screening infectious disease patients (Referred to as "Infectious Disease Control Facilities") as prescribed by the Ordinance of the Ministry of Health and Welfare. ③~⑤ omitted

- A “negative pressure isolation area” refers to an area engineered to maintain lower air pressure compared to other areas of the building for the purpose of treating high-risk infectious disease cases; it includes patient rooms, auxiliary rooms, and other essential support facilities
- A “non-negative pressure area” refers to an area adjacent to the negative pressure area; equipped with facilities like a nursing station to prepare the treatment of infectious disease patients and monitor the patients’ condition
- A “negative pressure isolation room” refers to a room where a patient with infectious disease can be hospitalized:
  - The room is constantly maintained with negative pressure; it includes shower facility and lavatory directly accessible from the patient room. The pressure in the lavatory with a toilet is set the lowest so that the air flows from the patient room to the lavatory
- A “general isolation patient room” refers to the patient room, which was prepared with the support of the nationally-designated inpatient beds project prior to 2015 that lacks negative pressure facility
- An “anteroom” refers to an area reserved for preparing basic infection control and for preventing airborne infection; it helps to maintain a stable air pressure in the negative pressure area; it includes “patient room anteroom” and “corridor anteroom”
  - “Patient room anteroom” refers to an area between the negative pressure isolation room and the internal corridor; it is reserved for the preparation of infection control; it prevents the leakage of air into the internal corridor when entering and exiting the room
  - “Corridor anteroom” refers to an area between the non-negative pressure area and the internal corridor; usually set to a negative pressure in order to maintain the negative pressure in the internal corridor
- “Internal corridor” refers to a corridor inside the negative pressure isolation area; it connects the patient room anteroom, corridor anteroom, PPE doffing room, waste disposal room, and equipment storage room
- “Required support facility” refers to the “PPE doffing room,” “waste disposal room,” “equipment storage room,” etc.
- “PPE doffing room (hereafter doffing room)” refers to a space connected to the internal corridor where healthcare providers who completed patient care take off personal protective equipment (PPE) before entering the general area
  - It includes shower room, dressing room reserved for after shower, etc. and may include additional decontamination spaces to prevent respiratory and contact transmission.
  - The PPE donning room may be built outside the negative pressure area; in the case of space constraints, nursing station and PPE storage area can be used
- “Waste disposal room” refers to a space healthcare wastes generated during the treatment are sterilized or stored before disposal; it is connected to the internal corridor; it is set to a negative pressure lower than the internal corridor. A sterilizer may be installed if necessary
- “Equipment storage room” refers to a space reserved for storing or disinfecting mobile equipment used for the treatment of the patients with infectious diseases and the likes; it is connected to the internal corridor
- “HEPA filter or filter equivalent or higher” refers to a filter with a decontamination function equivalent or higher than that of HEPA filter (which can remove 99.97% or more of the 0.3μm particles)

4. Operation Status and Planning

- As of 2006, 566 rooms (194 negative pressure and 372 general) are under construction in 29 hospitals nationwide, starting with the National Medical Center and the Armed Force Capital Hospital
  - In 2015, the government expanded the construction of negative pressure isolation rooms with increased budget (in 10 existing locations and 10 new locations)

Table 1: Nationally-designated inpatient beds and negative pressure room expansion before and after comparison table

Number	City province	Hospital name	Before expansion		After expansion		Remark
			Single patient room	Shared room (# beds x # rooms)	Single patient room	Shared room (# beds x # rooms)	
1	Seoul	National Medical Center	2	5 x 3	4	5 x 3	Existing
2		Seoul National University Hospital	2	2 x 2	7	0	Existing
3		Seoul Medical Center	5	-	10	-	Existing
4		Chung Ang University Hospital			4	-	New
5		Hanil General Hospital			3	-	New
6	Gyeonggi	Armed Forces Capital Hospital	3	-	3	-	
7		Myongji Hospital	2	2 x 2	7	2 x 2	Existing
8		Seoul National University Bundang Hospital			9		New
9	Incheon	Incheon Medical Center	1	2 x 2	7	0	Existing
10		Inha University Hospital			4		New
11		Gachon University Gil Hospital			5		New
12	Gangwon	Gangneung Medical Center	1	2 x 2	1	2 x 2	
13		Kangwon National University Hospital			3		New
14	Daejeon	Chungnam National University Hospital	1	2 x 2	8	0	Existing
15	Chungbuk	Chungbuk National University Hospital	2	2 x 1 3 x 2	2	3 x 2 2 x 1	
16	Chungnam	Dankook University Hospital	1	2 x 2	7	0	Existing
17	Jeonbuk	Chonbuk National University Hospital	1	4 x 1	4	4 x 1	Existing
18		Wonkwang University			3		New

		Hospital					
19	Gwangju	Chonnam National University Hospital	1	2 x 2	7	0	Existing
20		Chosun University Hospital			5		New
21	Jeonnam	Mokpo National Tuberculosis Hospital	2	4 x 2	2	4 x 2	
22	Gyeongbuk	Dongguk University Gyeongju Hospital	1	2 x 2	1	2 x 2	
23	Daegu	Daegu Medical Center	1	2 x 2	1	2 x 2	
24		Kyungpook National University Hospital			5		New
25	Ulsan	Ulsan University Hospital	5	-	5	-	
26	Gyeongnam	Gyeongsang National University Hospital	1	2 x 3	1	2 x 3	
27	Busan	Pusan National University Hospital	5	-	5	-	
28		Busan Medical Center			5		New
29	Jeju	Jeju National University Hospital	2	2 x 1	7	2 x 1	Existing
Total			39	31(79)	135	21(59)	
			70(118)		156(194)		

II. Applicable Standards

1. Applicable Facilities

- Infectious disease management facilities under Article 36 and Article 37 of the *Infectious Disease Control and Prevention Act of Republic of Korea* (hereinafter referred to as the "Act") and the first clause of Article 2[2] of the *Regulations on the Operation of Nationally-Designated Inpatient Beds*

2. Applicable Infectious Diseases

- Among the infectious diseases proclaimed by the Ministry of Health and Welfare as per the Article 41 of the Act, those with extremely high risk of transmission; they include Severe Acute Respiratory Syndrome (SARS), Animal influenza virus, Influenza A(H1N1)pdm09 virus, Middle East Respiratory Syndrome (MERS), emerging infectious disease syndrome, infectious diseases spread through bioterrorism, etc. that require isolation
- Other infectious diseases that the director of the Korea Centers for Disease Control and Prevention decide as requiring isolation and inpatient treatment at nationally-designated inpatient bed

3. Individuals Subject to Inpatient Treatment

- Infectious disease patients corresponding to diagnosis criteria for infectious diseases listed above (Table 2 related to the fourth clause of Article 6 of the Enforcement Rules)

[2] *Regulations on the Operation of Nationally-Designated Inpatient Beds*. Article 2 (definition). Terminologies used in this law are defined as follows.

① “Nationally-designated inpatient bed (“inpatient bed” hereafter)” refers to infectious disease management facilities in which special facilities and equipments are installed in a separate compartment in order to prevent the infection of patients and healthcare providers as well as the spread of microorganisms in the process of treating patients with emerging infectious diseases and etc. under ordinary times and under “national public health emergency” (“emergency” hereafter).

②~④ omitted

Chapter 2. Definition of Isolation Inpatient Treatment

I. Purpose and Basic Principles

- To prevent the infection of other patients and healthcare providers in the process of treating patients with infectious diseases; to suppress the transmission of causative pathogens to the community
- Isolation methods are applied depending on the mode of transmission of each pathogen and the condition of each patient
- The methods and procedures for isolation inpatient isolation treatment accord with Table 2[3] of Article 23 of the Enforcement Rules of the Infectious Disease Prevention

[3] Table 2 of the *Enforcement rules of the Infectious Disease Control and Prevention Act of Republic of Korea*. Methods and Procedures for Home Treatment and Inpatient Treatment (Relating to Article 23); 1~2 omitted

3. Inpatient Treatment Methods

A. During the period of inpatient treatment for infectious diseases, except for infectious diseases which may spread via the respiratory tract (hereinafter “respiratory infectious diseases”), patients must be hospitalized in a single-person room equipped with a sink and a toilet in a healthcare facility designated by the infectious disease management facility, governor of a municipality, or head of city/county/district. In case the treatment in a single patient room is not possible, patients may be placed together in a room with another patient with the same disease or a patient with low risk of reinfection.

B. In the case of respiratory infectious diseases, the patient must be treated in a single patient room in a healthcare facility designated by the infectious disease management facility, governor of a municipality, or head of city/county/district. This single-person room must have a negative pressure facility once the door has been closed and independent air circulation. If a negative pressure facility is unavailable, the patient must be treated in a separate, freestanding facility. In case the treatment in a separate facility is not possible, the patient may be isolated together with another patient as long as measures are taken to protect the other patient from infection via the respiratory tract.

C. Patients under inpatient treatment must be prohibited from leaving their room and moving around during the treatment period.

D. All discharge, secretions, excrement, etc. from a patient under inpatient treatment must be strictly controlled; contaminated items should be disinfected.

E. Visitors, including healthcare providers, should be restricted to the minimum. All visitors must wear PPE such as disposable gloves, etc., wash hands, and take other measures to prevent the spread of infectious disease.

F. Medical devices used for the treatment of these patients must be disposable; they need to be disposed of immediately after each use. Devices inadequate for single use such as thermometers, etc., should be allowed exclusive use on a single patient.

4. Inpatient Treatment Procedures, etc.

A. Once a patient is admitted for inpatient treatment, the healthcare provider, the head of the infectious disease management facility, or the head of the healthcare facility who examined and/or diagnosed the patient should immediately report to the director of the Local Public Health Center.

B. Upon receiving the report, the director of the Local Public Health Center must immediately confirm inpatient treatment.

C. The duration of inpatient treatment shall last from the time the patient is found to have an infectious disease until all symptoms disappear and the patient is determined as no longer infectious.

D. The head of the healthcare facility and healthcare providers at the facility shall release any patient who, through treatment, has become eligible for release. They must report the release immediately to the director of the Local Public Health Center, who shall immediately confirm the release.

E. Carriers who show no symptoms but are still infectious shall receive ongoing treatment under the purview of the director of the Local Public Health Facility; until they are determined as no longer infectious, they shall receive inpatient treatment in a healthcare facility or be treated at home.

II. Function of Isolation Inpatient Beds

- Treatment
  - Because healthcare providers in PPE are conducting multiple types of tests and treatments, the isolation inpatient beds require special equipment and more space compared to a general ward.

- Prevent the spread of infection
  - Patients with infectious diseases and the likes are examined and treated in patient rooms in which negative pressure is maintained by the air circulation systems so as to prevent secondary infections within the hospital and the transmission of infectious pathogens through contacts

- Secure Safety for Healthcare Providers
  - The safety of healthcare providers is secured through routine facility and equipment check-ups and training and education of infectious disease control

Chapter 3. Facility Standards of Inpatient (Isolation) Beds

I. General Information

- Inpatient treatment beds are affiliated facilities within a hospital, functionally connected to existing hospital facilities for easy access

- Secure an independent route so that patients with infectious diseases and the likes are able to move from the outside to negative-pressure isolation areas without going through other departments
  - When considering sites and other conditions, if infectious disease wards are placed on the second floor or above, patients and medical staff should either have a separate elevator or a separate route secured through which they can access these wards
    * Facilities created before 2015 that are unable to separate routes for patients and healthcare providers should design and implement Standard Operating Procedures (hereafter, SOPs) to prevent the spread of infection when transporting disease patients

- Physically separate the inpatient beds from the general area of the hospital and divided into negative pressure isolation areas and non-negative pressure areas

- Negative pressure isolation areas should include hallways, doffing rooms, anteroom, patient rooms and restrooms, waste disposal facilities, equipment storage areas, and so on. A nursing station should also be designed for easy observation of negative pressure isolation areas.
  * Facilities created before 2015 that do not include all of the necessary supporting facilities (doffing rooms, waste disposal facilities, equipment storage areas) should use the space within the negative pressure isolation area for such facilities; if there is not enough space to do so, facilities should design and implement SOPs for disinfecting doffing rooms, waste disposal facilities, and equipment storage areas

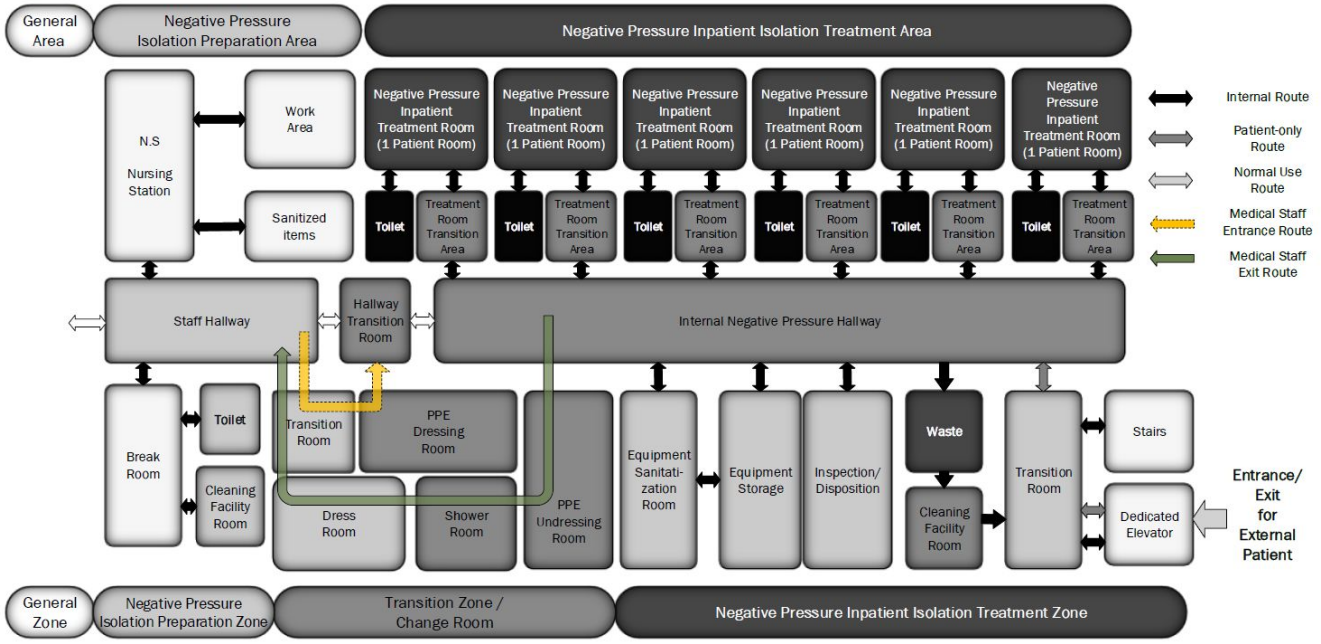


Figure 1. Example of mid-corridor negative pressure isolation inpatient treatment beds (darker color indicates stronger negative pressure)

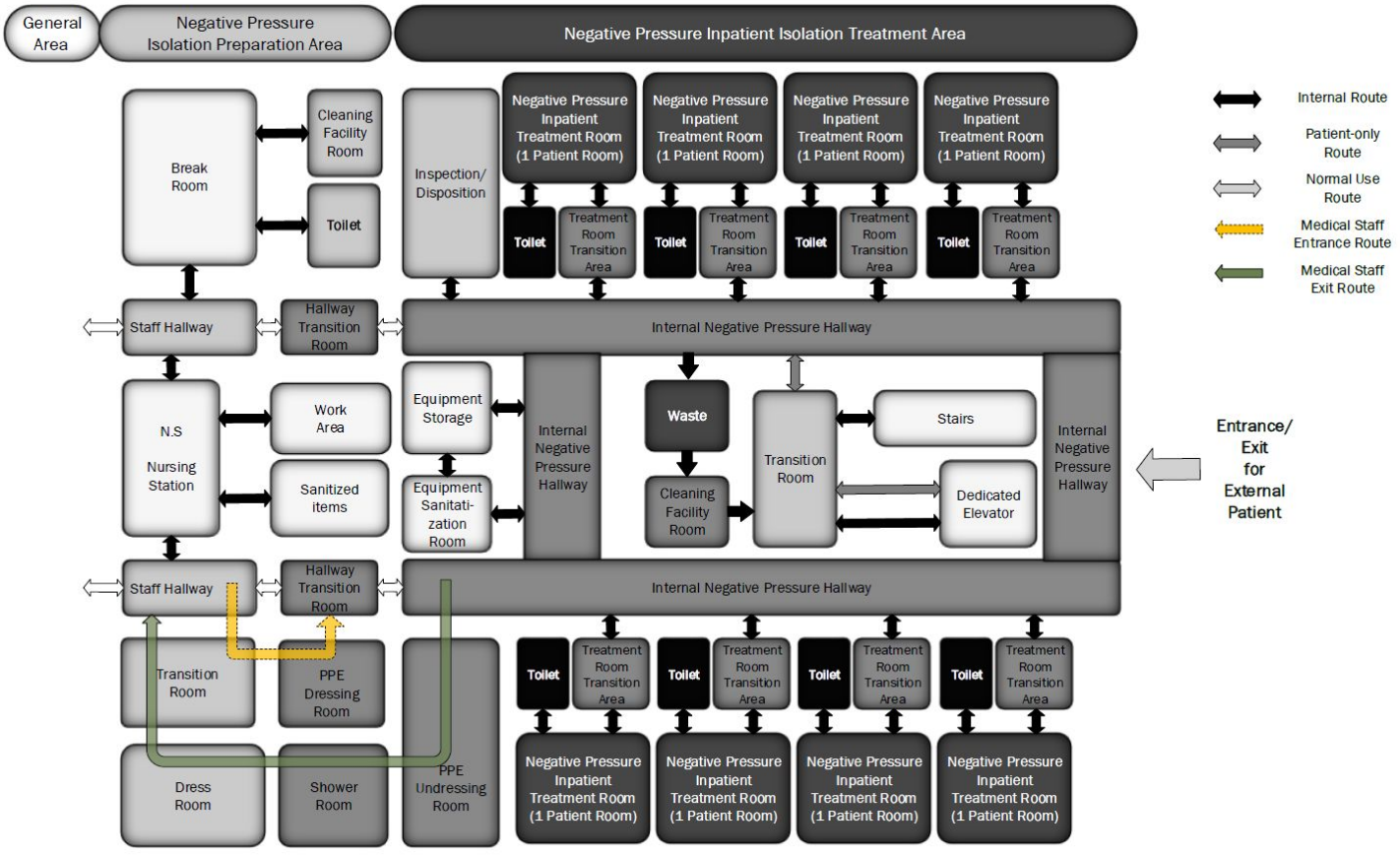


Figure 2. Example of double-corridor negative pressure isolation inpatient treatment beds (darker color indicates stronger negative pressure)

II. Facility Standards of Negative Pressure Inpatient (Isolation) Beds

1. Architectural Planning

1) Common Requirements

A. Composition of negative pressure isolation area

- Physically separate non-negative and general areas from negative pressure isolation areas
- In principle, a negative pressure isolation room should be a single room
- Secure proper dimensions of ceilings and entrances.
  - The ceiling height of hallway and isolation rooms is more than 2.4m to relieve pressure from isolation.
  - The width of major entrances of isolation rooms and anterooms is more than 1.2m to facilitate transportation of patient transport beds

B. Airtight structure

- Protect all walls, floors, and ceilings in the negative pressure isolation area from air circulation and humidity, and seal the joints of the walls
- Secure air tightness across all windows in the negative pressure isolation
- Seal attachments, such as sockets and power switches and various HVAC, sanitary, and electrical pipes, to maintain air tightness and prevent from becoming air pathways

C. Materials

- In order to maintain negative pressure, use interior materials with good sealing performance
- Use durable, water-resistant, and chemical-resistant finishing materials for ceilings, floors, and walls to prevent chemical reactions during sterilization, and use easy-to-clean methods and materials
- Round off all corners to avoid dust gathering and for easy clean up
- If curtains or blinds are required, make them easy to clean and minimize surface irregularities (Built-in blinds are recommended)
- Use antimicrobial silicone for sealing

D. Doors and windows

- In order to maintain negative pressure in the room, use airtight windows that should only be allowed to open in emergencies
- Doors on either side of adjacent rooms in negative pressure areas, such as those between patient room anteroom, corridor anteroom and donning/doffing room, should not open simultaneously (use an interlocking door system). However, the interlocking system should be manually or automatically released in case of emergencies including fires.

    - When drafting the operational plan for each hospital, prepare a patient evacuation plan (SOP) in case of emergencies including fires
  - Install automatic doors for patient room, patient room anteroom, and corridor anteroom
  - In principle, doors of patient rooms, patient room anterooms, and corridor anterooms should allow for opening and closing in a non-contact manner, and should be kept closed unless necessary
  - Installation of reinforced glass doors (at least 12mm) or observation windows (at least 0.72m^2) is recommended at the entrance of patient rooms and anterooms in the negative pressure isolation area to allow monitoring of the interior.
  - Install pass boxes to move goods between negative and non-negative pressure areas when necessary

2) Architectural Planning by Room

A. Negative pressure isolation room

  - Patient room
    - To account for activities of healthcare providers, use of medical devices, and arrangement of patient furnitures and fixtures, secure at least 15m^2 of effective area (net floor area) for a single patient room, excluding anteroom, bathroom, wall, etc.
    - Secure a proper outside view from the patient's room
    - It is recommended that furniture in the patient room be hung on the wall as much as possible to prevent the spread of contamination on the floor.
    - Use built-in furniture if fixed-type is used but allow for floor cleaning
    - Seal joints of walls, ceilings, and floors airtight
  - Accessory bathroom
    - In patient room, install a separate private bathroom to allow direct access to room without having to go through anteroom
    - Install shower facility but not bathtub
    - Install a sink with non-contact faucet in bathroom; wall piping is recommended for sink and facility piping
    - The floor should not accumulate water and should be non-slip
    - The floor gradient should be placed so that water from the bathroom or the shower does not flow to the hospital room
  - Patient room anteroom
    - Considering transportation of patient bed, recommended area for patient room anteroom is at least 4m^2 and at least 2.4m in depth
    - Locate patient room anteroom between internal corridor and patient room in negative pressure area
    - It is recommended to install sinks with automatic faucets and wall piping
    - Do not allow patients to enter or leave at any time

B. Internal corridor

  - Corridor
    - Separate the route between healthcare providers and patients entering the internal corridor
      - If the facility was built before 2015 and healthcare providers and patients cannot be separated, an SOP should be prepared to prevent infection while patients move

- Corridor anteroom
  - When moving patient beds, an area of 4m^2 and depth of at least 2.4m are recommended to maintain the door interlock on both sides of the corridor

C. Waste treatment room

- Prepare sufficient space for the temporary storage of waste from inpatient treatment, in a location from which contaminants can be safely removed
  * If a facility was built before 2015 and does not have a waste treatment room, utilize a space in the negative pressure area; if this is impossible, arrange another way to safely store and handle waste in case of a public health crisis according to Article 10 of the *Regulations on the Operation of Nationally-Designated Inpatient Beds*
- Autoclave sterilization installation is recommended
- Separation of healthcare providers' route and waste removal routes is recommended

D. Doffing room

- Install a doffing room, shower room, and a post-shower dressing room at the exit of the negative pressure (isolation) area
  * If a facility does not have a doffing room because it was built before 2015, utilize a space in the negative pressure area; if this is impossible, arrange another way of installing a doffing room for PPE in case of a public health crisis under Article 10 of the *Regulations on the Operation of Nationally-Designated Inpatient Beds*
- Install a full-length mirror in the doffing room to check the process of doffing PPE, and to check if PPE is donned correctly before entering the hospital room
- Since it is used to remove contaminated PPE, make doffing room a negative pressure area, with sufficient space to properly doff PPE
- Install a dedicated waste container for the disposal of PPE in doffing room
- If necessary, use a separate decontamination room with sufficient area or an existing doffing room to decontaminate PPE before doffing

E. Equipment storage room

- Provide an equipment storage room for storage and disinfection of equipment for isolated patients within the negative pressure isolation area
  * If a facility does not have an equipment storage room because it was built before 2015, utilize a space in the negative pressure area; if this is impossible, arrange another way to safely store and disinfect equipment exclusively for isolated patients in case of a public health crisis according to Article 10 of the *Regulations on the Operation of Nationally-Designated Inpatient Beds*

F. Nursing station

- Place nursing stations in non-negative pressure that is physically separated from the negative pressure area; nursing stations should be equipped to monitor pressure differences, temperature, and humidity for all rooms in the negative pressure isolation area, and to activate alarms in case of emergency

- Nursing stations should be equipped to monitor patient status such as blood pressure, pulse, and oxygen saturation, and to communicate with patients and healthcare providers in inpatient rooms

3) Others

- If necessary, arrange proper space and facilities for the autopsy of human remains in the hospital
- If necessary, arrange a separate laboratory space to test specimens
- Designate areas to store, don and doff PPE
  - Install a full-length mirror in PPE donning/doffing room to check whether the equipment is properly donned

2. Mechanical Facilities

1) HVAC System

A. HVAC system method

- Construct HVAC systems in negative pressure isolation areas as dedicated ventilation facilities separate from ventilation facilities in other areas of the hospital
- Equip the system to prevent the spread of infection and cross-contamination caused by the backflow of air, and/or when the HVAC system stops due to power failure, mechanical failure, etc.
- Place exhaust vents near the patient, preferably on the wall near patient's head
- Install ports that can be decontaminated when replacing filters, which should be HEPA equivalent or higher
- Equip to maintain proper temperature and humidity without opening windows, but do not install fan-coil units, system air-conditioners, etc. that can cause summer seasonal bacteria (eg, Legionella)
  * If the system has established before 2011, and the fan coil for air-conditioning and heating is already installed, clean pipelines with chemicals or clean and disinfect air circulation filter regularly to prevent growth of bacteria
- A room noise level below 50dB(A) is recommended

B. Supply system

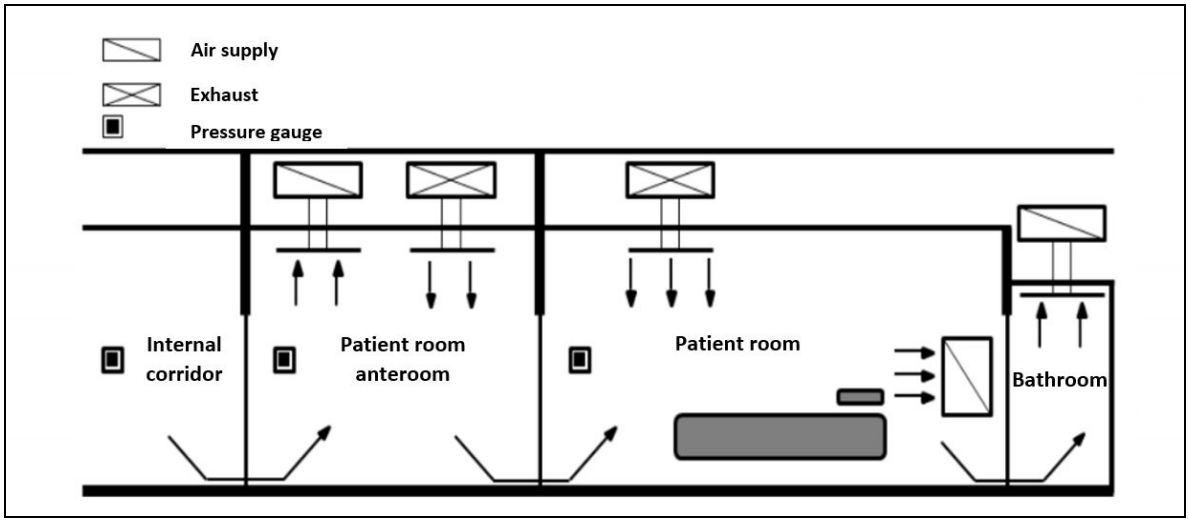
- Have a dedicated supply and exhaust system, with all-outdoor air supply
- Ventilation should occur at least 6 times per hour; 12 times or more is recommended
  - Do not recirculate emitted air from patient room and anteroom to another space even if filtered with HEPA filter equivalent or higher
- To prevent backflow of contaminated air from patient room in case of HVAC system shutdown, install HEPA filter equivalent or higher in air supply vent, or install airtight back-draft damper in air supply system in each room
- Establish a supply-and-exhaust interlocking system to prevent leakage of contaminated air in case of malfunction; if unable to establish such a system, set air supply to start automatically after exhaust system

C. Exhaust system

- Discharge all exhaust air outdoors through a HEPA filter or a filter of the same level or higher
- Place the vent near the patient, preferably on the wall near the patient's head
- Exhaust the ducts from each room independently, and install exhaust fans at the ends. However, if each exhaust contains a filter or a back-flow prevention damper (Airtight Back Draft Damper), the ducts can be integrated from the rear end of the filter or damper.
- Install a spare exhaust fan in the negative pressure isolation areas to prepare for failures
- Install exhaust vents outside the buildings at a height of 2m or above from the ground to prevent direct venting towards pedestrian traffic, and at least 2m clear of any inlet systems.
- The system should have a larger capacity than the airflow volume needed for maintaining negative pressure
- Connect exhaust fans in the negative pressure isolation area to the UPS and the emergency back-up generator to ensure its operation during power outages

D. Negative pressure control

- Set the air pressure in the room to ensure air flows from low-polluted area to the high-polluted area: 1) non-negative isolation area 2) corridor anteroom (doffing room) 3) negative pressure corridor (internal corridor) 4) patient room anteroom 5) patient room 6) bathroom
  - Differential pressure devices are unnecessary between the bathroom and the patient room as pressure difference between the bathroom and the patient room is to prevent the flow of unpleasant odors.



- Install air supply and exhaust vents in negative pressure isolation rooms and patient room anterooms to maintain stable air pressure; however, only exhaust vents are needed in the bathrooms.
- Maintain a pressure difference of at least -2.5Pa between rooms such as the bathroom, patient room, patient room anteroom, and the internal corridor
- At exit points in negative pressure isolation areas, install pressure gauges that display air pressure to the first decimal place (0.1Pa)
- To maintain stable pressure control, install pressure controllers in a central control room

- Only approved personnel should have access to controls
- In the event of an emergency, the manager and healthcare providers should be able to take immediate action, and any malfunction should be automatically recorded

E. HEPA filter or equivalent filter units

- HEPA filters (or equivalent filter units) must allow scans such as PAO* tests during normal operation; they must also be sealable and sterilizable when replacing.
  (**Translator's note: Poly Alpha Olefin*)
- Keep particle transmittance rate under 0.01% upon scanning
  - When performing scans with a tube (Probe scan), the scan should include the gasket (filter mounting frame) and keep a leakage rate under 0.005%

2) Sanitary Facilities

A. Sanitary equipment

- Hand-washing facilities should allow for face-washing, and should be designed to prevent water splashing while big enough to contain hands up to the wrists
- Faucets of sanitary equipment should enable usage without touch (e.g. touchless sensor faucets)
- Wall piping recommended when installing washbasins
- Wall-mounted storage units for paper towels, detergents, and disinfectants may be installed near the hand-washing facility
- Flush-valve-type toilets are recommended for toilets in negative pressure patient rooms
- Wall-mounted toilets are recommended

B. Water and hot water supply

- Install backflow prevention valves before the terminal plumbing fixture to prevent contamination due to backflow
- Hot water should be supplied through a separate hot water supply system that prevents cross-contamination
  - However, if an effective backflow prevention valve is installed in each room, hot water supply can be recirculated
- Ensure there is no backflow through water supply pipes when connecting with toilets
- When using detergents or disinfectants, install the containers above the hand-washing facility to prevent contamination of washbasin countertops, walls, etc.

C. Drainage

- Install drain pipes and vent pipes connected to the hand-washing sink, toilets, etc. to prevent drain backflow
- Recommend that the drainpipe in the negative pressure isolation area be independently connected to a dedicated wastewater storage tank

3) Wastewater (Drainage) Treatment Facility

- Place a dedicated wastewater storage tank and include the tank into the general wastewater treatment facility after disinfecting or sterilizing
- Ensure that wastewater treatment equipment materials are suitable for chemical or thermal treatment
- Install a vent pipe in the wastewater storage tank to prevent wastewater backflow and connect a sterilization filter to the bottom of the vent pipe
- Set up equipment (e.g. mineral tanks or ozone facilities) for biological inactivation of microorganism and verification ports
- If a dedicated sterilizer is installed in the negative pressure isolation area, discharge condensate water from the sterilizer into the dedicated wastewater storage tank

4) Fire-Fighting Equipment

- Install watering devices like a fire hydrant (outside the negative pressure isolation room) in case of fire
- A fire sprinkler system should be designed to prevent malfunction
- Keep all doors in the negative pressure isolation area open automatically or manually in case of fire
- Place fire extinguishers in each room

5) Medical Gas Facility

- Oxygen and compressed air can be supplied through the general system
  - However, designated areas should be controllable through automatic shut-off valves
  - Transportable medical gas equipment can also be used
- If wall-mounted medical gas outlets are installed on the patient room wall, do not allow air to escape from the patient room
- Prevent spread of the infection to other patient through suction equipment
- In the negative pressure isolation area, set up suction equipment in each designated area as a separate system or use a mobile aspirator, and install HEPA filters (or equivalent) in the vacuum pump exhaust
- Suction tank in the machine room should be set up to enable cleaning and disinfection. Disinfect the drain used to clean the suction tank, or connect to an independent drainage system.

3. Telecommunication Facilities

1) Lighting

- All lighting should be designed to create a pleasant environment, with easily cleanable materials and structure
- Use light fixtures with airtight structures
- Localized illumination of at least 500 Lux is recommended
- To prevent contamination, install lighting with replaceable parts from the ceiling (upper parts) and/or from the interior (lower parts)

2) Back-Up Generator

- Operate back-up generator to maintain stable pressure in the negative pressure isolation areas
- Ensure exhaust fans in negative pressure isolation areas are connected to UPS* and back-up generator to maintain exhaust system function even under power outage situations (**Translator's note: Uninterruptible Power Supply*)

3) Automated Control System

- Operate HVAC system automatically (computer control)
- Install a monitoring system to display temperature and humidity, pressure differences and door sensors of each room
- Set off an alarm system to alert emergencies such as an error in pressure differences, etc.
- Record a malfunction history automatically when an emergency alarm sounds

4) Communication Systems

- Install equipment to allow video medical service and patient visits, as well as easy access to the nursing station (video calls, closed-circuit television (CCTV) cameras or wireless devices, etc.)
- Enable checking of visitors and patient status by installing CCTV cameras for monitoring patient rooms and hospital wards

III. Management of General Isolation Beds

- Keep general isolation beds prioritized for isolating close contacts of confirmed cases in case of crises
  - Make sure air flows from the corridor to the patient room and use portable negative pressure equipment when needed in general isolation rooms
  - Maintain isolation facilities to house asymptomatic close contacts with underlying medical conditions during a crisis(e.g. cohort isolation) and to serve as supporting facilities required for treating patients in negative pressure isolation rooms

PART II

Operating Standards of Nationally-Designated Inpatient Beds Responding to Emerging Infectious Diseases

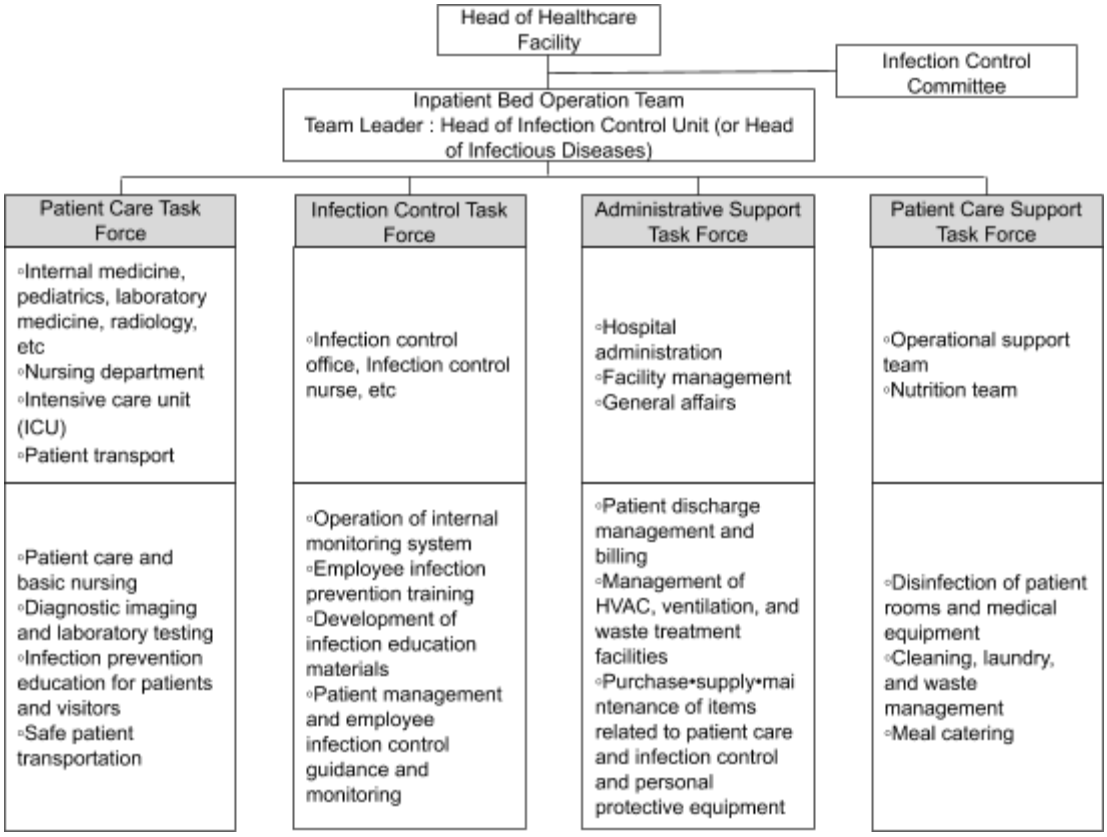
Chapter 4. Operation of Inpatient Beds

I. Inpatient Bed Operational Structure and Functions

1. Inpatient Bed Operational Structure

- The head of a healthcare facility must organize and administer the “inpatient bed operation team”, whose purpose is to prepare and respond to the emerging infectious disease

Example: Inpatient bed operation team structure and tasks



2. Inpatient Bed Operational Functions

A. Head of Healthcare Facility and Infection Control Committee

- Head of the Healthcare Facility
  - Support various matters for the safety of inpatients and healthcare providers; responsible for safety in general
- Infection Control Committee
  - Deliberation and management of policy for isolation of emerging infectious disease patients,

medical care, and prevention of hospital-acquired infection
- Review and coordination of overall operational management of inpatient beds

B. Inpatient Bed Operation Team Main Tasks*

- Handling inpatient bed operation
- General education and training of personnel in the hospital
- Establishing a workforce coordination plan that can immediately intervene when admitting a patient with emerging infectious disease

Consists of Patient Care Task Force (internal medicine, pediatrics, laboratory medicine, radiology, nursing department, ICU, etc.), Infection Control Task Force, Administration (general affairs, hospital administration, facility management), and Patient Care Support Task Force (operational support team, etc.) which are adjustable according to the circumstances of each institution

- Patient Care Task Force
  - Patient care and basic nursing
  - Diagnostic imaging and laboratory testing, processing and management of high-risk testing specimens
  - Infection prevention education for patients, guardians and visitors
  - Tasks related to patient care such as safe patient transportation
- Infection Control Task Force
  - Operation of internal monitoring system
  - Employee infection prevention training
  - Develop hospital-acquired infection education materials
  - Patient management and employee infection control guidance and monitoring of patient contacts
  - Infection management tasks such as new case notification (public health centers)
- Administrative Support Task Force
  - Patient discharge management and billing
  - Maintenance of general, HVAC, wastewater treatment facilities
  - Administrative tasks for patient care and management, such as purchasing and supplying items related to patient care and infection control, personal protective equipment, etc.
- Patient Care Support Task Force
  - Disinfecting patient rooms and medical equipment
  - Cleaning, laundry, and waste management
  - Non-medical support services necessary for patient care such as meal supply

II. Preparation for Inpatient Beds

1. General Preparation

- Ensure adequate staffing for immediate response to sudden increases in hospitalization of patients with emerging infectious disease (sufficient to cover reduced staffing due to infections within medical personnel)
- Prepare to put patients with emerging infectious disease in hospital isolation within 4 hours (Emergency contact network, provision of personal protective equipment, facility inspection and emergency operation training, etc.)
- Maintain appropriate pressure gradient and air tightness at all times and conduct regular inspections of isolation bed facilities (HAVC, HEPA filters or equivalent, sanitary plumbing, wastewater treatment facilities, emergency power supplies, etc.)
- Ensure the movement routes of healthcare providers and sanitized items to not overlap with those of patients, contaminants, and waste
- When admitting patients, the healthcare providers wearing personal protective equipment should move from the internal corridor, patient room anteroom, and into the patient room.
  - Medical personnel exiting the room should move from the patient room → patient room anteroom → internal corridor → doffing room → (shower room) dressing room → non-negative pressure areas
- Prepare internal guidelines to treat all waste from patients in hospital isolation as “isolation healthcare waste” according to the “Waste Management Act”

2. Operation of Patient Rooms

- The head of the healthcare facility can use inpatient beds for patients with tuberculosis and respiratory infections during non-emergency, ordinary times
- However, at least one or more negative pressure rooms (more than 20% of the number of negative pressure rooms) must be assigned as reserve beds to immediately admit patients with emerging infectious disease
  - In case of hospitalization of a suspected case -- not a confirmed case -- make the decision of relocating existing patients in addition to reserve beds considering the possibility of cross-contamination between patient rooms
- In preparation for situations including health emergencies requiring hospitalization of more patients with emerging infectious disease than the available number of reserve beds, the head of the healthcare facility should prepare a relocation plan for existing patients

  * Infectious Disease Control and Prevention Act of Republic of Korea, Article 38 (Prohibition of refusal to admit patients with infectious disease)
  - In the event of a health emergency, a relocation plan for existing patients to reassign all nationally-designated inpatient beds to reserve beds should be executable within 4 hours, ensuring no cross-contamination during relocation process

3. Equipment and Supplies for Inpatient Beds

- Doffing room
  - Personal protective equipment (PPE) waste container, full-length mirror
    * Provide full-length mirror and personal protective equipment (PPE) in the donning area.
- Patient room anteroom
  - Full-length mirror* and personal protective equipment instruction guide
    * Double-check donned PPE with the full-length mirror before entering the patient room
  - Alcohol hand sanitizer
  - Wash basin
  - Designated container and inner plastic bag for healthcare waste from isolation rooms
- Isolation inpatient rooms
  - Prepare minimum but adequate equipment for treatment and for convenient sterilization
  - Devices (e.g. telephone or videophone) to allow communications with nurses and physicians in charge
  - Other instruments or medications necessary for treatment/procedure can be brought in and used; however, when removed, used items either must be separately packaged for safe disposal. Reusable items must be moved to the sterilization facility through a separate route and appropriately sterilized prior to reusing.
  - Other necessary equipment at the discretion of the healthcare providers
- Waste treatment room and storage room
  - Set up within the negative pressure area. Discharge isolation healthcare waste in designated healthcare waste container or in designated healthcare waste container after sterilization (autoclave)
- Equipment storage room
  - Set up within the negative pressure area for disinfecting and storing equipment used in the isolation inpatient rooms

III. Operation and Support for Dedicated Inpatient Beds Team

1. Organization of Dedicated Team

- Organize and manage in advance a dedicated team for the operation of isolation inpatient beds
  - For the patient care task force, organize in advance a team centered around the department of infectious disease and related departments; secure personnels required for shifts (minimum 2 shifts per day)
  - Ensure sufficient staffing in case suspected cases among medical personnels at the facility may lead to vacant posts
  - Prepare and establish plans for additional and long-term workforce in case of increase in patients

2. Infection Prevention Management Education and Training for the Dedicated Team

- Training should be conducted at least once a year (at least 8 hours)
  - Training time can be adjusted according to the duties of the personnel, except for the patient care task force and infection control task force
    * Use the Education and Training Support Center for Nationally-Designated Isolation Beds (http://www.phcret.or.kr)
  - Conduct mock training session at least once a year

3. Dedicated Team Management

- The infection control task force must perform active monitoring of all employees with possible exposure to the pathogen, either from contacts with the patients with emerging infectious disease or during cleaning and waste treatment
- The head of the healthcare facility should provide the inpatient beds operation team with the following in preparation for an increased risk due to treating isolated patients with emerging infectious disease
  - Regular physical examination and if necessary vaccination of seasonal influenza
  - Mental health services for managing psychological stresses
  - Compensation system for treating patients with emerging infectious diseases
  - Dormitory or residential quarter for healthcare workers who need to be quarantined due to patient care

Chapter 5. Patient Care

I. Hospitalization of Patients with Emerging Infectious Disease

1. Hospitalization in inpatient beds

- In principle, a patient with an emerging infectious disease should be allocated to a single patient room
- Patient's movement should be restricted to the room
  - A designated healthcare worker should accompany the patient when movement is unavoidable
- Minimize the number of persons entering and exiting the room
- Only trained personnel should enter the room, and should not be treating other inpatients if possible to reduce the possibility of cross-contamination
- Appropriate PPE determined according to the type of disease and the transmission path should be worn by all healthcare workers who come into contact with the patient
- Mobile imaging equipment and testing equipment used in the isolation area should only be used within the area
- Medical personnels treating patients with emerging infections should consider that hospital-acquired infection may occur; should always comply with infection control guidelines of the healthcare facility

2. When Group (Cohort) Isolation is Necessary

- If a hospital equipped with negative pressure rooms with multiple beds is short of beds due to a large number of incoming patients with the same emerging infectious disease, suspected cases should be each admitted in single patient rooms while confirmed cases can be admitted together in shared rooms
- A minimum of 1.5 m is required between beds in a shared room

II. Diagnostic Specimen Collection and Transport

In principle, guidelines for the particular infectious disease should be followed. This guideline describes general procedures for specimen collection and transport
Reference: Guidelines for the Safe Transport of Infectious Substances (2015); the Criterion for Diagnosis and Report of Nationally Notifiable Infectious Disease

1. General Precautions for Specimen Collection

- In principle, specimen collection for the diagnosis of emerging infectious diseases should be carried out in the inpatient treatment facility
  - However, if a testing request is required in accordance with the guidelines for the infectious disease, the Local Public Health Office presiding over the the inpatient facility will be in charge
  - In addition, if it is necessary to transport specimens in accordance with the guidelines for the infectious disease, a responsible personnel at the Local Public Health Center (or a professional specimen transport vendor) will transport directly to the Centers for Disease Control and Prevention (the responsible department under the National Institute of Health) or the Research Institute of Public Health and Environment
- Specimen collection should be conducted by trained medical personnel (physicians, nurses, etc.); if necessary, it can be performed by trained clinical laboratory technicians
- Healthcare workers collecting and handling specimens must follow bloodborne infection management guidelines and standard precautions for handling infectious substances and specific precautions for transmission paths of the disease; they must wear PPE according to the method of specimen collection and transmission paths
- Use safety needles for specimen collection to prevent needlestick injury
- Specimens should be packaged in designated packaging containers to avoid contact with other objects or equipment
- Instruments, contaminants, and other equipment used for specimen collection must be disinfected or sterilized
- All places where specimens were handled must be disinfected before and after use with disinfectants certified by Food and Drug Administration
- Dedicated testing equipment for the diagnosis of emerging infectious disease specimens may be placed and operated in the negative pressure isolation area

2. General Precautions for Transporting Specimen

A. Specimen Packaging

1) Place specimen in the primary container; label and then disinfect the container with disinfectant
2) Wrap the disinfected primary container with an absorbent material (e.g. paper towel) and place inside a secondary container
3) Tightly close the secondary container’s lid and place it inside a tertiary container
4) Place *Laboratory Test Request Form* under the tertiary container’s lid and pack tightly

5) On the tertiary transport container's exterior surface, write down sender, receiver, and emergency contact information
6) Place the tertiary transport container in an ice box; insert refrigerants (ice packs) around all four sides of the container
7) Mark the sealed ice box's exterior with Infectious Substances label, UN 2814 (infectious substance affecting humans, category A) label, package handling label ("This way up"), sender, receiver, and emergency contact information

Category	Packaging container
Primary container	
Secondary container	
Tertiary container	

Figure 1. Exemplary Containers for Triple Packaging

B. Specimen Transport Management

1) Local Public Health Center presiding over the healthcare facility will designate personnel in charge of specimen transport

   <u>Designate a person in charge if delegating to a professional specimen transport vendor</u>

   * For transporting specimens, designate one person in charge of driving and another person in charge of overall transport
   * Transport immediately; maintain the temperature at 4°C

2) Selection of transport vehicles and specimen placement: Place packaged specimens in the trunk of a personal vehicle (or designated vehicle); secure specimens to minimize shaking; keep PPE, contamination treatment equipment (e.g. spill kit), disinfectant, emergency warning triangles, etc. in the vehicle in case of emergency

III. Transportation of Isolated Patients to Testing Facilities, etc. within the Hospital

1. Moving Patients within a Healthcare Facility

- Tests are performed at the bedside whenever possible to limit the patients' movement; patients should be moved only when absolutely necessary
  - Patients should be transported via a predetermined route at a predetermined time by a patient transporter in charge in order to minimize the exposure of other patients and healthcare providers
  - Designate an elevator exclusive for isolated patients and take precaution to prevent other patients from using the elevator; before moving a patient, contact the testing facility in advance to ensure it is prepared
- Ensure that the patient being moved wear PPE designated for exclusive use in order to minimize exposure through contact or breathing
  - Patient with respiratory infectious disease should wear a N95 or higher grade mask
  - For a patient with severe breathing difficulties, a respirator with a HEPA filter can be used to filter the air
  - Use transport equipment with a HEPA filter if available
- Patient transporter in charge
  - A person responsible for transporting patients with emerging infectious disease should be designated and trained in advance
  - The transporter in charge should wear appropriate PPE during patient transport
  - Patients shall be transported via a predetermined travel route (using an elevator reserved exclusively for patients with emerging infectious diseases), which should be the shortest route over the shortest time to minimize contact with other patients and healthcare providers
  - After using wheelchairs or transport carts, disinfect surface according to the prescribed method
  - After transport, PPEs should be removed and handwashing should be performed according to the prescribed method

IV. Diagnostics and Imaging Tests

1. Precautions for Diagnostic Tests

- Conduct blood and chemical diagnostic tests in a laboratory facility compliant with level 2 biosafety standards
- Select dedicated staff to perform diagnostic tests; if necessary, designate a separate test room for emerging infectious disease specimens
- Wear appropriate PPE (disposable gloves, gowns, N95 equivalent masks and safety glasses, etc.) when testing specimens from suspected patients of emerging infectious diseases
- Any work that may form aerosols must be done in a biological safety cabinet
- After use, disinfect the biological safety cabinet and any instruments used with a disinfectant proven to be effective
- Sterilize the instruments and equipments used for specimen collection and biohazard materials generated
- Staff involved in conducting diagnostic testing who experience symptoms of the infectious disease should report to the infection control task force immediately

2. Precautions for Imaging Tests

- Select a task force of dedicated radiographers and provide them with infection prevention training before they begin work
- Recommend the use of mobile X-ray equipment in isolation beds
- Radiographers should wear appropriate PPE (disposable gloves, gowns, N95 equivalent masks, etc.) when entering patient rooms
- Thoroughly disinfect any parts of equipment that may have come into contact with patients after imaging and testing

V. Management of Visitors and Caregivers to Isolated Patients

- In principle, caregivers and visitors are prohibited from entering the isolation room
  - Recommend communication via video calls, etc. in a designated visiting area
  - Advise in advance that measures to prohibit visitors and caregivers from entering are effective ways to prevent community spread of infectious diseases
- Check all visitors for symptoms according to prescribed questionnaires, including members of the patient's family and caregivers
- For pediatric patients who require the presence of a caregiver and thus they must stay in the isolation room with the patient, the caregiver can be granted permission to enter the isolation room under the supervision of healthcare provider; the inpatient bed operation team (infection control task force) should provide infection prevention education and actively monitor caregiver
  - Actively monitor them from time of last exposure to the patient while the patient was still deemed infectious; continue to monitor them for the longest known incubation period for the particular infectious disease; however, if a patient is discharged during the caregiver’s incubation period, inform a public health center, who will then actively monitor them until the end of the incubation period
- If healthcare provider judge that a patient is allowed visitors, all visitors must wear PPE and be supervised by inpatient bed healthcare providers; minimize visit time and number of visitors
  - A patient close contact management ledger should be kept, and the completed list of close contacts (close contact management ledger) submitted to the public health center

VI. Transfer of Isolated Patients to Another Hospital

Patient transfer is at the discretion of healthcare providers; the following guidelines outline specific precautions for transfer

- Preparations for patient transfer
  - Transport in a hospital or public health center ambulance (use isolated bed carrier with HEPA filter if available)
  - Patient transfer team should include minimal number of personnel (driver, public health staff, healthcare providers, etc.), and transport no persons other than the patient if possible
  - Contact receiving healthcare facility in advance to allow preparation for patient's arrival
- Considerations for infection prevention
  - Wear PPE according to prescribed regulations when transferring a patient suspected of having the infection
  - Refrain from aerosol-generating procedures before arriving at the hospital
  - Do not eat, apply make-up, or touch contact lenses etc. when transporting patients
  - After patient transfer, clean and disinfect vehicle and transfer equipments according to established procedures, as pathogen transmission from the patient is possible
- Patient management
  - Put protective clothing and masks on the patient to minimize exposure through a respiratory exposure or physical contact
  - For respiratory infections, patients should wear N95 equivalent mask
  - If the patient has severe breathing difficulties, ventilators with a HEPA filter for exhaled air filtration can be used

VII. Isolation Period and Patient Discharge

Patient discharge is subject to healthcare provider’s judgment and disease-specific guidelines.

1. Criteria for Release from Inpatient Isolation Treatment

- Criteria for release of patients from isolation differ for each infectious disease; clinician should assess and de-isolate at the time the patient is deemed no longer infectious (infectious disease symptom resolution, cease of virus excretion), but must discuss with the public health authorities to decide

2. Education for Discharged Patients

- Discharge the patient if all symptoms are resolved and the patient is no longer infectious; provide patient and caregivers with thorough infection prevention education on personal hygiene practices such as handwashing
- If the patient's general condition worsens or other symptoms appear such as fever, guide them to contact a public health center immediately (they should not visit the hospital)

3. Settlement of Fees for Discharged Patients

- In accordance with the “Infectious Disease Management Business Guidelines” of the Centers for Disease Control and Prevention, fees are covered by state (local government), with patient copayments based on the Ministry of Health and Welfare's treatment benefits standard

4. Discharge Notification and Contact Tracing

- The director of a healthcare facility should immediately report to the director of the local Public Health Center when discharging a patient from isolation inpatient treatment
- After immediately confirming a patient's discharge, the director of the local Public Health Center may conduct home quarantine or active monitoring for a fixed period of time, following guidelines for each infectious disease

Chapter 6. Infection Control

I. Infection Control for Healthcare Facility Employees

In principle, prevent and manage infection in accordance with infection control guidelines of each hospital, and for details such as the scope of exposure, follow the guidelines for each disease

1. Management of Exposure among Employees

A. Active Monitoring System for Healthcare Workers

- The chief of the healthcare facility should operate a monitoring system to prevent the spread of secondary infection caused by a healthcare worker who has been exposed to pathogens by treating patients with emerging infectious diseases
- Infection control task force should report immediately to the public health center if healthcare worker involved in care of patients shows symptoms of the infectious disease

B. Active Monitoring Support

- Prepare and provide the list of exposed persons
  - Create and manage lists of all contacts involved in management of patients with infectious diseases and those who have entered into the patient room
  - For active monitoring of exposed persons, provide the list of exposed persons and contact information to the health authorities to conduct active monitoring

C. Training of Exposed Persons

- Train on how to choose the proper Personal Protective Equipment (PPE) and how to wear and remove it, in accordance with standard precautions of infection prevention in healthcare facilities and based on the transmission characteristics of the emerging infectious disease
- Train on epidemiological characteristics and infection control methods of the emerging infectious disease
- Train to report immediately to the infection control task force when employees come in contact with patients without proper PPE or if they develop symptoms of infection such as fever

D. Management of Exposed Persons

- The exposed person is subject to home quarantine or active monitoring depending on the degree of contact
  * For classification and categorization of exposed persons, follow the guidelines of each infectious disease
- Management of exposed persons with symptoms
  - Immediately report to the public health center, and the public health center immediately reports to

the Korea Center for Disease Control through municipality
- If necessary, municipal COVID-19 epidemiological investigation team conducts the epidemiological investigation

2. Infection Management Plan and Operation for Employees

- Establish and operate management plan to protect both patients and healthcare provider by minimizing the risk of spread of infectious disease from patient to healthcare provider or from healthcare provider to patient
- The employee infection management program should include the following:
  - Medical examination
  - Safety education including health education and infection control
  - Immunization program
  - Job related countermeasures that are disease specific
  - Follow-up measures for employees at risk
  - Consultation on the job related infection risk
  - Maintenance of employee health management records

II. Personal Protective Equipment

Follow the guidelines for each disease for the types and methods of personal protective equipment. This guideline provides general information regarding personal protective equipment to prevent the spread of emerging infectious diseases

1. General Precautions for the Use of Personal Protective Equipment

- Public health personnel and healthcare workers who are in close contact with patients with emerging infectious diseases must wear personal protective equipment (PPE) and follow instructions
- Role of the manager
  - Regular education and training for staff members[4]
    - Training on selection, usage and management of appropriate PPE
    - Proper disposal of used PPE
    - Store reusable PPE after proper disinfection
  - Identify and provide necessary types and quantity of PPE
- Practice infection control methods including standard precautions, contact precautions and droplet (or airborne) precautions
- For effective prevention of infection, selection of appropriate PPE and correct use are important
  - Things to consider for selecting appropriate PPE
    - Expected types of exposure (direct contact, droplet splash, airborne inhalation, blood and body fluids splash)
    - Category of isolation precautions
      i. Standard precautions and droplet (including airborne) precautions
      ii. Select appropriate PPE based on the situation, activity, and purpose
    - Durability and appropriateness for the task, situation and activity
- Put on PPE before coming into contact with source of infection (e.g. before contact with a patient, outside an isolation room)
- Follow guidelines for each item of PPE (especially the close fit of respiratory protection equipment)
- Ensure that a contaminated PPE does not contaminate the surrounding environment
  - Avoid contact with surroundings other than with the patient while wearing PPE
  - When removing PPE, avoid contaminating own body parts and surroundings
- Remove used PPE away from source of infection (e.g. doffing room outside of the isolation room)
- Used PPE should be considered contaminated; dispose of PPE in the designated healthcare waste container to avoid contamination of surroundings
- As a general rule, all PPE should be used once and disposed
- Dispose of damaged or contaminated PPE; do not use or store them
- Should reuse of PPE be unavoidable, only reuse after proper sterilization; limit reuse to PPE for which sterilization* is possible (for example, PAPR parts)
  * For sterilization of equipment, follow manufacturer's instruction
- Always practice strict personal and hand hygiene (hand-washing or sanitizing) after removing PPE; hands, body parts, and/or clothing can be contaminated unknowingly and without being visibly soiled

[4] Be compliant with Industrial Safety and Health Act

2. Types of PPE

- Choose PPE that can protect the whole body including the respiratory system, eyes, hands and feet, from the source of infection
  - Gowns, gloves, masks, goggles or other eye protectors, boots or shoe-covers, etc.
- Important: Select and use appropriate PPE based on type of disease, transmission path, conditions of exposure to infection, and purpose
  - Consider the transmission path and characteristics of the pathogen. For example, emerging respiratory infectious diseases (respiratory virus capable of droplet or airborne transmission), viral hemorrhagic fever (high-risk virus capable of transmission through contact with blood and body fluids)
- **PPE-specific characteristics and indications for use**

Item	Hazard	Indications for use	Picture
Disposable gloves	Contact	• Hand protection against emerging infectious disease virus • Pick appropriate material given level of exposure • If allergic to powder, use powder-free or nitrile product	
Disposable waterproof long-sleeved gown	Blood or bodily fluids splashing on body or clothes	Prevents further indirect spread of pathogens via viral droplets of emerging infectious disease on body and clothes	
Full body protective suit[5] (coveralls)	Blood or bodily fluids splashing on body, clothes or shoes	Prevents further indirect spread of pathogen via viral droplets emerging infectious disease on body and clothes	
Shoe covers			

[5] Select protective clothing with protection against infectious materials. For example, in Europe, under EN14126, ASTM1671 regulations, use protective clothing marked with a biohazard label.

Boots	Blood or bodily fluids splashing on shoes	Use instead of shoe covers: ● When floor is wet or extensively soiled ● Choose based on exposure risk	
Hair cap	Soiling of hair	Prevents droplets from contaminating hair	
Goggles	Blood or bodily fluids splashing onto ocular mucous membranes	● Prevents infection of ocular mucous membranes ● For reuse, clean with antiviral disinfectant	
Face shield	Blood or bodily fluids splashing onto ocular mucous membranes	● Prevents infection of ocular mucous membranes and face ● Depending on exposure risk, can use instead of goggles ● For reuse, clean with antiviral disinfectant prior to reuse and storage	
Respiratory protection equipment[6]: surgical mask[7]	Inhalation of droplets	Prevents inhalation of pathogen particles via nasal or oral mucous membranes ● Mask is effective if the nose wire is adjusted so that there is no gap ● The front of the mask may be contaminated with droplets. Be careful to not touch when doffing (doff masks by holding the ear loops to prevent contamination and perform hand hygiene)	
Respiratory protection equipment: N95 equivalent	Inhalation of droplets or aerosols	Prevents inhalation of pathogen particles via nasal or oral mucous membranes − Usage examples: ● When entering confirmed or suspected patients' quarantine/isolation room (including all healthcare workers and visitors) ● During sputum induction ● During aerosol-generating procedures ● When transporting suspected or confirmed patients	

[6] Respirator: protective gear worn to prevent inhalation of pathogenic particles when breathing
[7] Facemask, isolation mask, and dental mask provide equivalent function

PAPR respiratory protection equipment[8]	Inhalation of droplets or aerosols	• Prevents inhalation of pathogen particles via nasal or oral mucous membranes • Requires thorough inspection and maintenance, including regular battery charge, filter exchange, and device disinfection • Check for damage and malfunction prior to use; ensure routine repair, exchange, or disposal • If reuse is unavoidable, disinfect* prior to reuse and storage * Refer to 'Appendix 11. Prevention of Infection in Healthcare Testing Facilities related to Emerging Infectious Diseases' - '10. Cleaning and Environment Management - Disinfectant' part	

❖ Reference: respirator class

USA (NIOSH)[9]	Europe (EU-OSHA)[10]	South Korea (Ministry of Food and Drug Safety)	Criterion			Note
			Particle Filtration Efficiency[11]	Minimum differential pressure[12]	Leakage rate[13]	
-	FFP[14]1	KF80	> 80% (Sodium Chloride test)	6.2 mmH_2O	< 25%	
N95[15]	FFP2	KF94	> 94% (Sodium Chloride & paraffin oil test)	7.2 mmH_2O	< 11%	Epidemic control purpose
N99	FFP3	KF99	> 99% (Sodium Chloride & paraffin oil test)	10.3 mmH_2O	< 5%	

[8] PAPR: Powered Air-Purifying Respirator
[9] NIOSH : National Institute for Occupational Safety and Health
[10] EU-OSHA : European Agency for Safety and Health at Work
[11] Filtration efficiency: The rate at which the mask filters out particles
[12] Differential pressure: Pressure drop across mask, or resistance to airflow.
[13] Leakage rate: The rate of air leakage through the gap between the mask and the face (the smaller the leakage, the better the adhesion and the higher the efficiency)
[14] FFP : Filtering Face Piece
[15] N95 according to the United States Respiratory Protective Devices Standard (42CFR84) means that the filtration efficiency for 0.3㎛ non-oil aerosol particles is more than 95%

❖ **Reference: Occupational Safety and Health Administration (OSHA) industry safety standards for personal protective equipment**

Class	Level A	Level B	Level C	Level D
Wearing example				
Protection characteristic and configuration	Highest level of respiratory and skin protection ● Completely sealed protective clothing ● Chemical resistant gloves ● Integrated chemical-resistant safety shoes	Highest level of respiratory protection ● Supplied Air Respirators ● Chemical resistant gloves ● Chemical resistant safety shoes	Skin and respiratory protection ● Chemical resistant protective clothing ● Air purifying respirators ● Chemical resistant gloves ● Chemical resistant boots	Skin and respiratory protection ● Full body protective clothing ● N95 equivalent mask ● Gloves ● Safety glasses (or face shield) ● Shoe cover
Application	Suspected contamination with high risk pathogen (ex, smallpox, plague)		Suspected contamination with high risk pathogen (ex, high-risk bacterial pathogens such as anthrax)	Suspected contamination with high risk pathogen (SARS, MERS, CoV etc.)

○ **Precautions for wearing N95 or higher grade masks**

- Make sure that the mask tightly adheres to your face (if you have facial hair, shave before wearing)
- Adjust the nose clip and pull the string to tightly adhere the mask. Perform a fit test if necessary
- After wearing the mask, blow air to make sure there is no leakage. If there is leakage, adjust again to tighten
- If the patient's secretions splash on or wet the mask, replace immediately and do not reuse

3. Donning and Doffing PPE

- How to don (put on) PPE
  - Prepare all equipment beforehand according to PPE recommendations per healthcare setting and put on equipment in proper sequence and method
    * Tie hair back in a secure manner and remove watch, jewelry, etc. to prevent contamination
    * Drink fluids to prevent dehydration and use the bathroom before donning PPE
    * In cases of contamination or damage to PPE when worn, change PPE before next treatment or provision of care
    * Rotate shift if you have been working until your inner gloves become wet
- How to doff (take off) PPE
  - Remove PPE in a location safe from the source of pathogen (e.g. changing room outside isolation room) and be careful not to contaminate body parts and surroundings
  - Take caution not to contaminate surroundings while removing PPE, and do so in the proper sequence and method; immediately discard them in designated healthcare waste box

Category		Sequence for N95 respiratory protection equipment and coveralls	Sequence for PAPR and coveralls
Donning order	1	Hand hygiene	Hand hygiene
	2	(Inner) Gloves	(Inner) Gloves
	3	Lower part of full-body protective suit	Full-body protective suit
	4	Shoe covers (or boots)	Shoe covers (or boots)
	5	N95 or higher grade respiratory protection equipment	Powered Air Purifying Respirator (PAPR)[16]
	6	Goggles (or face shield)	Hood
	7	Upper part of full body protective suit and tighten hood	Connect PAPR and hood
	8	(Outer) Gloves	(Outer) Gloves
(Remove PPE outside of infectious areas such as isolation rooms)			
	1	(Outer) Gloves	(Outer) Gloves
	2	Glove disinfection	Glove disinfection

[16] Follow manufacturer instructions for putting on and taking off PAPR and hood since it can be different for each product.

Doffing[17] order	3	Full-body protective suit	PAPR
	4	Shoe covers (or boots)	Hood
	5	Glove disinfection	Full-body protective suit
	6	Goggles (or face shield)	Shoe covers (or boots)
	7	N95 or higher grade respiratory protection equipment	(Inner) Gloves
	8	(Inner) Gloves	Hand hygiene
	9	Hand hygiene	-

[17] The inner glove can be contaminated while taking off the PPE. Therefore, it is useful to sanitize the gloved hand after removing each element of the PPE.

III. Environmental Management

1. Handling of Healthcare Waste

A. Principles for Handling of Healthcare Waste

- Handle all healthcare waste[18] from isolation inpatient beds as isolation healthcare waste[19].
- Use designated container made of synthetic resin as specified under the Waste Management Act for isolation healthcare waste. Use an additional inner plastic layer to prevent spillage.

Designated containers for isolation healthcare waste

Inner plastic bag

  - Designated containers must be marked (label on the outside) before use, and waste must be stored in the designated container from the time waste is generated
- Within 7 days of waste generation, request disposal through a vendor licensed in accordance with Article 25 of the Waste Management Act for waste collection, transportation, and incineration

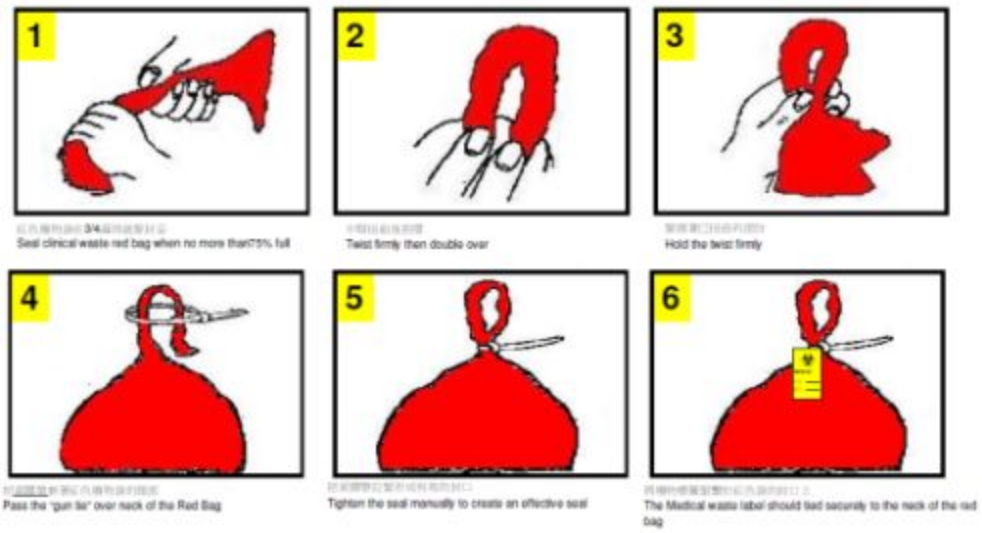
B. Procedures for Handling Isolation Healthcare Waste (When Autoclave Sterilization is Unavailable)

❖ Isolation waste must be disposed of according to the respective disease guidelines. This guide describes treatment methods for general cases.

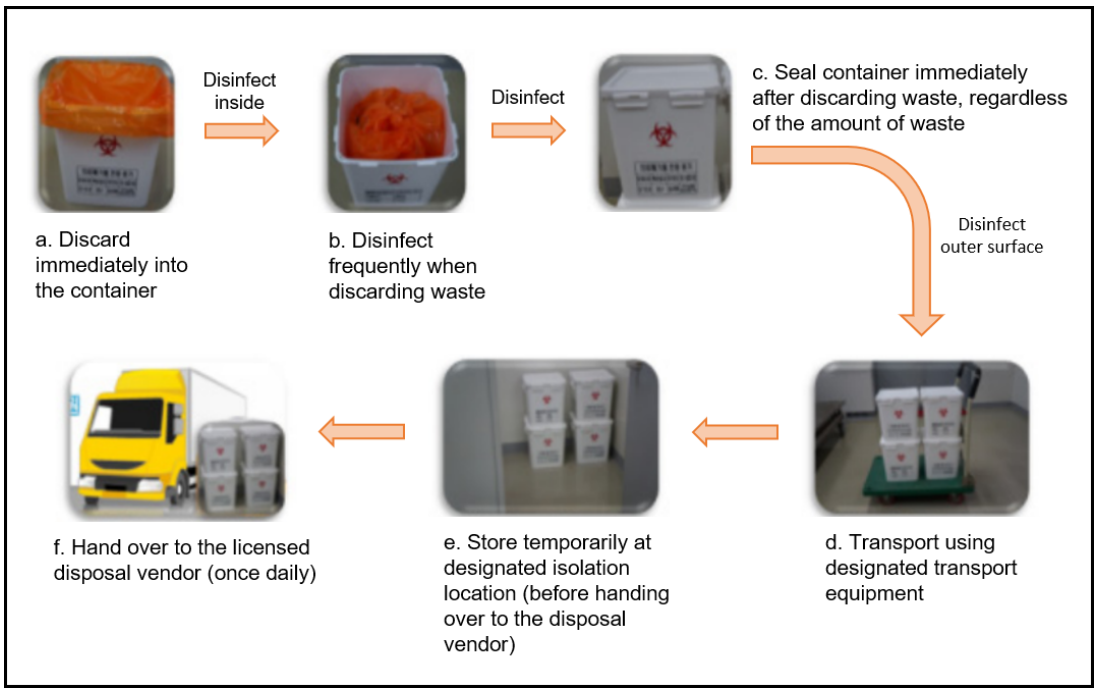
- Before using the designated container, insert the inner plastic bag and mark the label on the surface of the container
- Waste must not fill over 75% of the inner plastic bag, and the container must be frequently disinfected by spraying disinfectant when putting waste into the bag
- Pull the ends of the inner plastic bag together and seal with tape

[18] *Waste Management Act* Article 2-5. “Healthcare waste” refers to waste from health facilities, veterinary facilities, and test/laboratory facilities that may infect or otherwise harm the human body. It refers to waste that may require special management for public health and environmental protection, such as extracts including human tissues and the carcasses of laboratory animals, as specified by Presidential Decree.

[19] *Waste Management Act* Enforcement Decree Article 4 Annex 2 (Types of Healthcare Waste) 1. Isolation Healthcare Waste: Waste generated from medical care of individuals who are isolated to protect others from infectious diseases, as in “Infectious Disease Control and Prevention Act of Republic of Korea” Article 2-1.



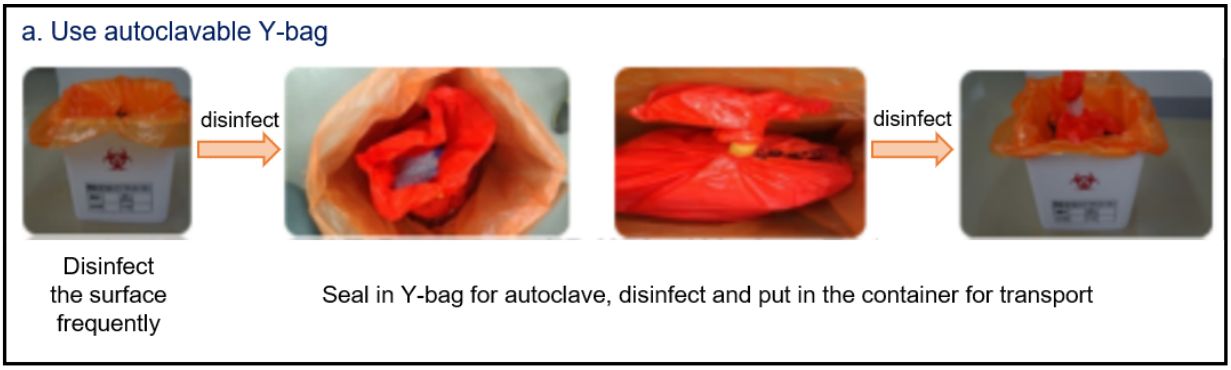
- For liquid waste, sterilize with disinfectant before closing the container for disposal
- After using the designated container, immediately close the container lid and seal regardless of the amount of waste in the container
- Use designated transport equipment to move and store waste at designated isolation locations. Hand over the temporarily stored containers to the licensed disposal vendor.
- After handover, confirm with the disposal vendor that the waste was incinerated

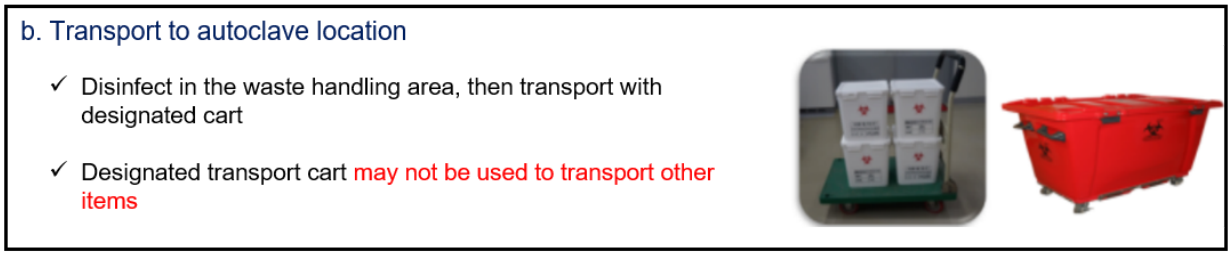


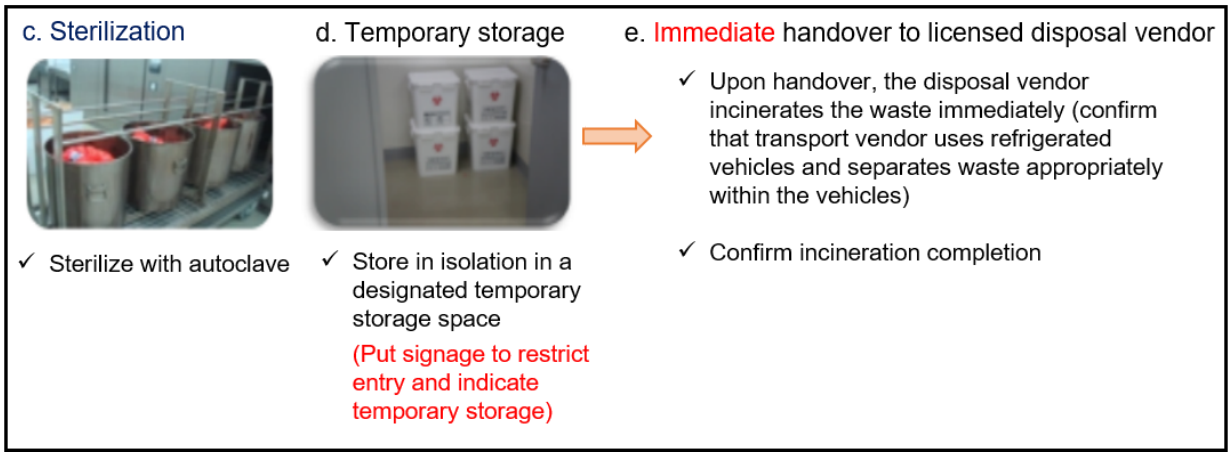
C. Procedures for Handling Isolation Healthcare Waste (When Using Autoclave Sterilization)

- Before using the designated container, line the container with the inner plastic bag, then insert a sterilization plastic bag that can withstand high temperature and high pressure (autoclavable Y-bag) inside the inner plastic bag. Mark the label on the surface of the container

- Waste must not fill over 75% of the bag and must be frequently disinfected by spraying disinfectant
- Loosely tie up the used Y-bag with tape (to allow high pressure vapor to enter during sterilization)
- Disinfect the outer surface of Y-bag and isolation healthcare waste container by spraying disinfectant
- Transport to autoclave location with designated transport equipment for isolation healthcare waste; insert only the Y-bag into the autoclave and sterilize (set proper sterilization time per pathogen)
- After sterilization, insert the Y-bag into the inner plastic bag inside the designated container so that it does not touch the outer surface of the inner bag, then pull the ends of the inner bag together and seal with tape.
- Close and seal the designated container
- Use designated transport equipment for healthcare waste to move waste to the designated isolation location for temporary storage. Temporarily stored containers are then handed over to the licensed disposal vendor.
- After handover, confirm with the disposal vendor that the waste was incinerated







D. Wearing Personal Protective Equipment While Handling Waste

- When handling isolation healthcare waste, wear the same personal protective equipment as medical personnel, and wear thick rubber gloves, impermeable gown and sealed boots.

2. Handling of Tableware, Bedding, Linen and Laundry

- Tableware, bedding, and linen used by patients with emerging infectious diseases are considered to be contaminated. It is recommended to put them in a biohazard bag and treat them as isolation healthcare waste.
- However, if hospital guidelines exist for infectious waste management and the washing of tableware, bedding, and linen within the facility, they may be followed.

IV. Inpatient Rooms and Disinfecting Equipment

Refer to the 'Guidelines of Disinfection and Sterilization (2014)' for medical equipment and the environmental management

1. Disinfectant

- Usable disinfectant
  - Principle of disinfectant use should follow the guidelines for each disease

2. How to disinfect

- General principle
  - Have trained personnel conduct disinfection and allocate designated personnel to the infectious disease patient bed
  - Wear PPE (disposable gown, disposable gloves, medical-grade N95 masks protective goggles or face shield)
  - If possible, disinfect the room of the emerging infectious disease patient everyday, as well as after the patient is discharged
  - After patient is discharged from the hospital, disinfect the room once it has been ventilated properly
  - Follow instructions of the disinfectant and use it appropriately throughout the hospital
- Disinfecting inpatient rooms, etc.
  - Disinfect frequently-touched surfaces every day, e.g. a side table, a desk lamp, bed rails which are touched often like doorknobs, a phone and inside the bathroom
  - After the patient is discharged, disinfect the contaminated walls, electric cords, switches, doorknobs, a bed, bedsheets, a wheelchair, a closet/shelves, a washstand, a toilet, etc.
  - Wipe the floor using disinfectant
  - After wiping door knobs with a wet disinfectant cloth, wipe with a clean cloth, then allow to air dry
- Disinfecting bathrooms and toilets

Division	Disinfecting method (example)
Toilet	- Close the lid then flush the toilet - Use the toilet brush to clean with disinfectant - Close the lid again and flush the toilet - Spray disinfectant onto the bathroom walls and connecting parts of the toilet - After spraying with disinfectant, leave it for 10 minutes, then flush - Place used toilet brush into a bucket filled with disinfectant for at least 30 minutes, then rinse with water and air dry
Bathtub and sink	- Wipe the bathtub and/or sink with disinfectant using the general-purpose brush - Spray disinfectant onto the bathroom walls, tub and connecting parts of the sink - When transporting items that need to be disinfected, put them into leak-proof bags; the carrier should wear PPE

Sewage outlet	- Drain about 0.5L of water into each outlet - Drain disinfectant into each outlet

3. Disinfecting Medical Equipment

- Disinfect medical equipment such as ventilators and pulse oximeters following the manufacturer's instructions
- When using chemical disinfectant, apply products that have been proven to be effective, such as alcohol-based products, hydrogen peroxide, iodophors, etc.; but nevertheless make sure of the safety of any residual concentration towards the human body

V. Management of Deceased Patient

1. After Death Handling of Deceased Patients

A. PPE for Persons in Charge of Handling Deceased Persons

- Wear PPE (on top of the healthcare worker's PPE, wear a waterproof long-sleeved gown, a plastic apron, and separate waterproof boots)
- Put used PPE in a biohazard bag and dispose of it as healthcare waste from isolated individuals

B. Management of the Dead Body

* As a rule, after death handling should be processed on the inpatient bed of the deceased, but it follows the relevant regulations and guidelines of each disease

- Do not clean or wipe the dead body if possible
- Do not remove the invasive tubes from the patient (intravenous catheter, endobronchial tube, gastrointestinal tube, etc.); immediately wrap the body in plastic at the site to prevent the external contamination
- Immediately seal the plastic-wrapped body in a leak-proof (waterproof) plastic bag with zipper
- If there are contaminated remains on the plastic bag: Remove, disinfect, and transport the remains to the morgue
- Persons in charge of handling deceased persons should comply with proper hand hygiene (wash hands with soap and running water or use alcohol hand sanitizer)

2. Handling the Funeral

- Follow the Infectious Disease Control and Prevention Act of Republic of Korea of Article 20-2 (Conducting Funeral)[20] and Article 17-2 (Restricted target for conducting funeral)[21]

3. Other Considerations

- If necessary[22], conduct an autopsy at a designated facility with the standard of safety control as per Article 20 or Article 17 (Standards of Autopsy Facilities) of the *Infectious Disease Control and Prevention Act of Republic of Korea*

[20] Article 20-2 (Conducting Funeral, etc) ① The Minister of Health and Welfare may restrict the funerary services when the death of a patient with an infectious disease occurs (including a person confirmed after death to carry the pathogen) to prevent the spread of infectious disease, if necessary.

[21] Article 17-2 (Restricted target for conducting the funeral, etc.) ① Article 20-2, according to paragraph 1, the body of the deceased that has restrictions of funerary services is a patient with infectious disease (including a person confirmed to carry the pathogen), which would be determined and announced by the Director of the Korea Centers for Disease Control and Prevention. In this case, the Director of the Korea Centers for Disease Control and Prevention may request related institutions, organizations, and experts to submit the opinions and data from before the announcement of the relevant infectious disease.

[22] *Infectious Disease Control and Prevention Act of Republic of Korea* Article 20 (Ordering of Autopsies), the Director of the Korea Centers for Disease Control and Prevention may order the autopsy for a body, whose death is suspected of infectious disease that may pose a great risk to the health of citizens, if the diagnosis of infection as well as the cause of death cannot be identified without performing the autopsy.

VI. Education on Infection Prevention

1. Education and Training for Personnel in Charge of Inpatient Treatment

- Form an inpatient bed operation team to prepare for and respond to patients with an emerging infectious disease and run educational programs on infection prevention
  - Conduct infection prevention management training at least once a year (8 hours or more; this may be adjusted depending on the workload of those in charge)
- At least once a year, conduct mock training with hospital staff on how to hospitalize, isolate, and treat patients with an emerging infectious disease to improve competency for risk management

2. Education for Caregivers and Visitors

- In principle, caregivers and visitors are prohibited from visiting infected patients; should a situation arise where such a visit is unavoidable, a caregiver or visitor may be permitted access to the patient under the supervision of the physician in charge; anyone who visits an infected patient in such a case must receive training on how to prevent the spread of infection and record their contact details in a ledger
  - Provide both patients and caregivers with information about the emerging infectious disease (characteristics, transmission paths, contagiousness, etc.)
  - Teach caregivers how to properly put on and take off PPE and how to practice hand hygiene
- If the patient absolutely requires a caregiver (e.g., pediatric patients, etc.), the caregiver must be actively monitored by the infection control task force within the hospital in accordance with patient care medical personnel

VII. Infection Prevention and Control

This page presents general standards for infection prevention and control to limit the spread of respiratory infections.

1. Basic Principles

- When providing medical services to (suspected) cases, strictly follow the standard cautionary guidelines.
- When having contact with (suspected) cases, wear PPE and conduct thorough hand hygiene
- Cleaning contaminated surfaces is also important
- When a new case is confirmed, share relevant information (location of case identification, patient's movement history, etc.) within the hospital

2. Establish an Infection Prevention and Control Policy

- Prepare organization structure and roles for personnel for infection management when a (suspected) case is admitted, and establish infection prevention and control guidelines (standard precautions as well as precautions for droplets and contact)
  - Confirm that the relevant organizations are notified of the situation, including administrative support departments and external organizations
- Prepare education and training programs on infection prevention and control guidelines, and conduct performance evaluations

3. Check Supplies for Infection Prevention & Control and Equipment in Patient Rooms & Facilities

- Confirm that negative pressure patient rooms, ventilation and air conditioning systems are working. Check movement paths of patients and healthcare staff, and disinfection and cleaning supplies.
  - Ensure that infection control products such as hand sanitizers and disinfectants* are set up and available. Confirm that healthcare staff have proper PPE and know how to use and check equipment.
    * Currently, hospital disinfectants approved by the Ministry of Food and Drug Safety can be used. Adhere to manufacturers' guidelines when using disinfectants, including for dilution, contact time and handling precautions.

4. Patient Room Layout and Use of Equipment

- Treat patients in isolation in a negative pressure room
  - Restrict movement of patients out of the isolation room except when necessary for medical treatment (when transporting a patient, s/he should wear a surgical mask to prevent the spread of respiratory secretions and contamination of the surrounding environment)
  - Use disposable or designated equipment (e.g. stethoscope, blood pressure monitor, thermometer) for isolated patients

  - Use designated transportable X-ray equipment and other diagnostic equipment for isolated patients
  - When medical equipment must be moved, use a designated path to minimize exposure to healthcare staff, other patients and visitors
- Designate medical personnel trained in infection control to be in charge of isolated patients

5. Standard Precautions for Managing Patients

- Healthcare providers should use appropriate PPE
  - Determine the type of PPE according to exposure risk, considering the expected amount and type of contact with patient
    - Wear goggles or face shields when performing procedures with a risk of exposure to face
    - Use respirators equivalent to or higher-grade than a N95 mask for aerosol-generating procedures
    - Wear waterproof protective suit (e.g. Level C) when there is a risk of contamination by body fluids
  - Ensure that PPE is doffed correctly by becoming familiar with doffing method to prevent direct skin contact with patient's respiratory secretions
- Hand hygiene
  - Clean hands using proper hygiene practices before and after providing patient care, before and after cleaning and disinfection, after any contact with the patient or exposure to body fluids, and after exposure to contaminated items and surfaces around the patient
  - Wash hands with soap and water. Alcohol-based hand sanitizer can also be used if there are no visible signs of contamination.
  - Do not wear rings, watches, bracelets
- Be cautious when using needles and sharp equipment, to prevent injury
- Safely manage waste
- Conduct cleaning and disinfection of surfaces in treatment rooms and patient rooms
- Clean and disinfect treatment equipment and supplies
  - Clean equipment such as carts and chairs with appropriate disinfectant after each use

6. Infection Prevention and Control during Aerosol-Generating Procedures

- Aerosol-generating procedures: Bronchoscopy, sputum examination, continuous positive airway pressure (CPAP), tracheal intubation and removal, airway aspiration, etc.
- Perform patient treatment with minimal medical personnel and in negative pressure room
  - Maintain facility so that air in patient room is ventilated 6-12 times per hour
- Medical personnel should wear appropriate PPE (see Attachment)
- Minimize entry/exit to treatment space during treatment
- Practice hand hygiene before and after contact with patient, and after removal of PPE
- Clean the negative pressure isolation room according procedures after use, and leave the room empty for a set period of time
  - Approx. 30 minutes based on 12 air circulations per hour

7. Intensive Care

- Wear appropriate PPE
- Use only respirators with high filtration efficiency
- Use disposable/single-use respirator whenever possible
  - Minimize reusable respirator and disinfect as recommended by the manufacturer
- Do not separate the ventilator circuit except in special circumstances
- When performing bagging, a ventilator should be prepared
- Use of a non-invasive positive pressure ventilator increases the risk of infection
- Use a heat and moisture exchanger whenever possible and avoid humidifiers

8. Sample Handling and Laboratory Management

- Healthcare workers involved in collecting or transporting clinical specimens should follow standard precautions to minimize risk of infection (all clinical specimens are considered potential sources of infection)
  - Healthcare providers performing specimen collection should wear appropriate PPE
  - The transporter of the specimen should be trained in biosafety and decontamination procedures in case of specimen leakage
  - Specimens should be packaged in three layers when being transported: specimen information is written on the primary container (containing the specimen), contained within a secondary layer (plastic bag/container), which is then contained in a third layer labelled with the infectious substance information
  - Hospitals and laboratories testing specimens must comply with biosafety guidelines according to the class of specimen
  - Transport of specimens within hospitals and laboratories should be carried out by a person
- Inspection in the laboratory
  - Wear appropriate PPE such as respirator (N95 equivalent or higher-grade mask), disposable gloves, disposable gowns and eye protection (goggles or face shield)
  - The following work should be carried out on a Class Ⅱ Biological Safety Workbench (BSC)
    - Suspension (stirring) of specimens and crushing or transfer of specimens to other containers
    - Dilution and dispensing of specimens
    - Nucleic acid extraction process from suspicious specimen (up to reaction of Lysis reagent)
    - Chemical and heat fixation and preparation for microscopic analysis
    - For centrifugation, putting or removing centrifugal tubes in buckets and rotors, etc.
      * When using a centrifuge, use safety buckets and sealed rotors, which physically seal the equipment
    - Other possible aerosol-generating work
  - Disinfect laboratory table and equipment
    - Disinfect using 70% ethanol solution for 10-30 minutes

9. Laundry, Cleaning and Waste Disposal

- Linen treatment
  - Provide a separate bag for linen from each single room - linen should not be removed from the patient room if it is not contained in bag
  - Used linen should be collected according to appropriate procedures to avoid contaminating the

surrounding environment
- Cleaning
  - Personnel responsible for cleaning should be educated and trained on infection prevention and control procedures
  - Personal protective equipment must be worn when cleaning
  - Clean every day; high-touch surfaces must be cleaned frequently throughout the day
  - Clean the isolation room last, after cleaning other patient rooms within the ward
  - Clean using disposable or designated equipment
  - Disinfect cleaning equipment with disinfectant after use
- Waste
  - All waste, such as healthcare waste, should be handled in accordance with the hospital waste management policies (especially feces and urine)
  - Handle waste in accordance with the Waste Management Act

10. Family and Visitor Management

- Limit the number of visitors and provide infection prevention and control training for approved visitors
- Appropriate personal protective equipment must be worn when visitors enter the isolation room
  * Provide visitors with education and training on the proper use of personal protective equipment and hand hygiene
- All visitors should be logged in a visitor log book

11. Sharing Information on Infectious Diseases within Hospitals

- Purpose: Prevent additional infection and spread of disease within healthcare facilities
- Share patient information (location of disease identification, movement history) with healthcare providers within hospital upon confirming an individual with an emerging infectious disease

Reference

Guidelines for standard precautions for infection prevention and control

1. General guidelines

- Hand hygiene
  - Hand-washing is the most basic and effective method for control and prevention of nosocomial infection
  - Wash hands after contact with blood, body fluids, secretions, excretions, and other contaminants
  - Wash hands immediately after removing gloves, before and after contact with a patient, to prevent pathogens from spreading to other patients or to the surrounding environment
  - Wash hands between treatments of different body parts of the same patient, to prevent cross-infection
  - Use regular soap for daily hand-washing, and disinfectants or waterless sanitizers may be used in special circumstances such as mass infections

- Gloves
  - Use to prevent contamination of hands, and to protect medical personnel from blood-borne diseases and other infections spread through contact
  - Gloves reduce the risk of spreading pathogens from the hands of healthcare provider to patients during treatment
  - Must be worn when in contact with blood, body fluids, secretions, or other contaminants, and when in contact with mucous membranes and damaged skin, to prevent spread of pathogens
  - Switch to new gloves before treating other body parts of the same patient if handling highly contaminated parts or substances.
  - Be careful not to touch other uncontaminated surfaces of equipment or in the surrounding environment, and always discard gloves after use and wash hands before interacting with another patient
  - Wearing gloves is not a substitute for hand-washing
- Masks, goggles, face protection
  - Use to protect the mucous membranes of the eyes, nose, and mouth when there is a risk of infection through contact during patient treatment
  - Use appropriate types of masks, goggles and face shields, on their own or in combination, to prevent infection through contact with blood, body fluids, secretions, and excretions, or any other contact with pathogens through mucous membranes during treatment
  - Surgical masks prevent the transmission of droplets of highly infectious particles when within a short distance (approx 1m) from infected patients who are coughing or blowing their nose
  - Surgical masks are not effective at preventing the inhalation of small droplets dispersed in air, and N95-equivalent breathing masks are recommended
- Gowns and protective clothing
  - Gown protects healthcare providers by preventing contamination of clothes and skin exposure to blood and body fluids
  - Wear clean gowns to prevent contamination from blood, body fluids, secretions, excretions, etc. that may land on clothes and skin during treatment
  - Remove contaminated gown and wash hands as soon as possible to prevent transmission to other patients or the surrounding environment
- Treatment equipment and supplies
  - Equipment contaminated with blood, body fluids, secretions, and excretions from infected patients should be treated with care to prevent exposure to skin or mucous membranes, or spread of pathogens to clothes or other patients and the surrounding environment
  - Reusable equipment should be properly cleaned and disinfected, to be reused according to type, use, manufacturer's recommendations, hospital guidelines or regulations. Single-use equipment should be disposed of after each use.
  - Other equipment should be cleaned and disinfected in accordance with hospital regulations
- Environmental management
  - Follow general cleaning procedures for patient rooms
- Linen and laundry
  - Linen contaminated with blood, body fluids, secretions, and excretions from infected patients should be treated with care to prevent exposure to skin or mucous membranes, or spread of microbes to clothes or other patients and the surrounding environment
- Plates, cups and kitchenware

- No special care is required, and the appropriate use of dish detergent and hot water is sufficient to decontaminate plates, cups, hospital tableware.

○ Prevention of employee infection and exposure to blood-borne pathogens
- Be cautious when handling needles, surgical scalpels and other sharp instruments to prevent stab injuries
- Be cautious when cleaning instruments after treatment and disposing of used needles. When disposing of used needles, re-cap the lid (preferably using a cap holder), or ensure the needle tip is facing away from the body when discarding.
- When disposing of disposable syringes, do not use the hand to remove the needle, and do not bend or otherwise manipulate by hand.
- Collect sharp objects such as used needles, disposable syringes and surgical scalpels in the appropriate sharps disposal bin
- When performing CPR, use ventilation equipment such as a mouthpiece, resuscitation bag, etc., instead of mouth-to-mouth, and avoid direct contact

○ Disinfection of patient rooms
- Isolation inpatient rooms and equipment in the rooms should be specially sterilized according to the specific infectious pathogens and degree of environmental pollution. Otherwise, follow hospital regulations for disinfection methods, disinfection levels, disinfection frequency and solutions.

2. Patient room layout

○ When single rooms are required
- If there is a risk of contamination from the patient to the surrounding environment, isolate patient in a single room. If this is not possible, consult with the infection control office.

○ When single rooms are not required
- When a group of individuals are infected via cluster transmission of the same pathogen, they can be isolated in the same room as a cohort (cohorting)
- Do not admit an infected patient and a regular patient into the same room. If this is inevitable, detailed caution and training of patients, staff, and visitors are required to prevent the transmission of infection. Special care should be taken to assess and select patient(s) being admitted to the same room.

○ Movement of infected patients
- Limit movement of infected patients within the hospital. Movement outside the patient room should only occur when absolutely necessary, to reduce the risk of pathogen transmission
- Appropriate protective equipment (e.g. mask) should be worn by the patient if movement should occur

3. Target

○ Apply to the treatment of all patients

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