# COVID-19 Guidelines: Hospital-level Healthcare Facilities

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**The Korea Centers for Disease Control and Prevention**

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# I. Checklist for Healthcare Facilities

- **Establish a COVID-19 Response Team**
  - The team includes members of diverse professional backgrounds and should consist of an infection control personnel (physicians, nurse etc.) as well as representatives from the Health and Safety Department, Environmental Management Department, Education Department and others, depending on the size of the facility.
  - The team plans and distributes COVID-19 infection control protocols suitable for the situation of the facility.
  - The team should nominate an infection manager and operate an emergency contact list in order to boost responsiveness to emergency situations.

- **Implement prevention measures from the screening stage**
  - Always follow the Standard Precautions from the screening stage. Isolate suspected patients and put a surgical (or medical-grade) mask on them.

- **Train and manage health workers and staff**
  - Staff should be trained in compliance with COVID-19 infection control protocols.

- **Give appropriate instructions to family, visitors and caregivers**
  - Place materials on COVID-19 near the entrance and other conspicuous areas.
  - Direct patients to a screening center if they have a fever or respiratory symptoms.
  - Promote hand hygiene and respiratory hygiene/cough etiquette to patients, families and caregivers, while restricting visits to essential visitation only.
  - Provide hand sanitizers in waiting areas e.g. in hospital wards, outpatient facilities and emergency rooms, among others.

- **Manage facility entrances**
  - Use a designated route for transporting suspected patients to prevent contact with general patients. Put a surgical (or medical-grade) mask on the patient during transport.

# II. Immediate Measures for Healthcare Facilities

| Category | Details |
|---|---|
| **Patient Classification** | • Put a surgical (or medical-grade) mask on suspected patients. Isolate the suspected patients in a designated (isolated) area.<br>• Suspected patients should maintain at least a 1-meter distance from other patients.<br>• Advise all patients to cover their mouth and nose with a tissue or with their elbow when sneezing or coughing.<br>• Practice hand hygiene after contact with respiratory droplets. |
| **Droplet Precautions** | • Droplet precautions are prevention measures against transmission of respiratory virus through large droplets.<br>• Individuals who treat patients within 2 meters should wear a mask (KF94, N95 or equivalent).<br>• Allocate each patient to a single room or to a ward with other patients who have the same etiological diagnosis.<br>• If it is difficult to assign rooms based on the same etiological diagnosis, group patients by similar symptoms and their epidemiological risk. The patients should still be separated within the room.<br>• If a close contact is required to treat a patient who has respiratory symptoms (cough, sneeze etc.), the staff should wear eye protective equipment (e.g. goggles).<br>• Restrict patients' movement and ensure they wear a mask when they leave the ward. |
| **Contact Precautions** | • Droplet and contact precautions prevent in/direct transmission via contaminated surfaces and materials.<br>• Wear personal protective equipment (PPE: mask, goggles, gloves and gown) when entering a ward, and remove them before exiting the ward<br>• If possible, use disposables or dedicated equipment (stethoscope, blood pressure cuff, thermometer).<br>• Disinfect reusable equipment following each patient's contact.<br>• Medical staff should avoid touching their face with contaminated gloves or |

| | |
|---|---|
| | unclean hands.<br>• Precautions must be taken to prevent contamination of environmental surfaces surrounding the patient such as door handles and light switches.<br>• Restrict patient's movement. Transfer only when absolutely necessary.<br>• Practice hand hygiene. |
| **Airborne Precautions (for aerosol generating procedures)** | • Medical staff should wear the appropriate PPE (surgical gloves, long sleeved gowns, eye-protection and fit-tested masks (N95 or higher) during aerosol generating procedures: open aspiration of the airway, tracheal intubation, bronchoscopy, cardiopulmonary resuscitation etc.<br>• If possible, perform procedures in a negative pressure room with the minimum number of practitioners required. Once mechanical ventilation is established, provide further patient care in an isolated room of an equal level of ventilation. |

***** Source: Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected: Interim guidance (January 2020), WHO

# III. COVID-19 Prevention and Management in Healthcare Facilities

## 1. Basic Principles

We propose a systematic infection control directive based on Contact and Droplet Precautions, in order to minimize exposure to and transmission of COVID-19.

### 1) COVID-19 Response Team

- ○ Establish a COVID-19 Response Team to develop, maintain and operate infection prevention measures.
- ○ With the clinical director as the head of the team, members should include representatives from the patient contact department, the infection control team, the diagnostics department, the facility team, the administration and the nutrition team.
- ❖ Alternatively, institutions that have an existing infection control committee can form the team around the existing committee members.

**Table 1. Examples of Committee Members**

| Level | Committee Members | |
|---|---|---|
| Head | Clinical Director | |
| Members | Chief of internal medicine | Head of operating room |
| | Manager of infection control | Manager of pharmacy department |
| | Person in charge of Infection control | Manager of central supply |
| | Chief of laboratory medicine | Manager of administration office |
| | Manager of nursing department | Manager of nutrition department |
| | Chief of emergency medicine | Manager of general affairs department |
| | Head of intensive care units | Manager of facilities management department |

**2) Core measures**

The core elements of infection prevention and control policies are administrative, environmental and ventilation control, and application of precautions.

a) Administrative measures

- This is the most critical step of infection prevention and control.
- The headquarters (HQ) should be formed with designated personnel to develop and implement policies for effective infection control.
- Roles of the HQ:
  - quickly identify COVID-19 suspected cases, apply contact and droplet precautions, implement isolation for containing the source of infection, and lay the foundation for clinical, epidemiological and laboratory assessments;
  - oversee the maintenance of the facility and the provision of supplies;
  - establish a relevant system of staff training;
  - prepare and implement policies to prevent overcrowding in waiting areas;
  - manage patient allocation;
  - systematize the supply of medical services and the use of goods;
  - ensure the health and safety of health workers and monitor the risk of acute respiratory infection amongst them; and
  - monitor workplace compliance with internal policies (including hand hygiene).

b) Environment and ventilation management

- Ventilation should be adequately maintained, and appropriate cleaning and disinfection should be carried out.
- Appropriate ventilation or negative pressure facilities should be checked at least once a day. In particular, the door of the negative pressure isolation room should be closed at all times.
- Patients with acute respiratory problems as well as others should maintain at least a 2-meter distance from one another in the screening center's waiting area (including medical staff without PPE).

c) Application of precautions

- Apply standard precautions to all patients and apply aerosol and droplet precautions where necessary.
- The standard precautions include hand hygiene, respiratory infection prevention principles and adequate use of PPE (Appendix 2).
- PPE should be worn correctly and continuously according to the recommended level. Sufficient supplies with training should be provided for all the staff.

### 3) Isolation room

- Use a negative pressure area with High Efficiency Particulate Air (HEPA) filters. If there is no ventilation system, the facility should secure adequate ventilation by ensuring a minimum of 12 air circulations per hour.
- Use a single-person isolation room with a toilet and washbasin.
- Establish methods to communicate with the outside of the isolation room (e.g. a telephone).
- Secure an anteroom for putting on and/or removing PPE.
- Minimize the number of furniture and maintain patient-specific equipment including stethoscope, thermometer and blood pressure monitor.
- Prepare waste containers for disposing of used paper towels, tissues and disposable gloves and hand hygiene supplies (e.g. soap, lotion, paper towels, hand sanitizers).

### 4) Patient and staff routing

- Establish a route so that confirmed (or suspected) patients do not contact other (general) patients.
- Medical staff should take off their PPE before leaving the office.
- Surgical or medical-grade masks should be put on patients during transport. If needed, gowns and gloves should be worn according to risk assessment.
- Do not transport patients unless absolutely necessary. Relevant information must be provided prior to transport.
- If a confirmed (or suspected) case is escorted by a guardian, the guardian should wear the same level of PPE as the medical team.

## 2. Patient Isolation and Precautions

### 1) Overall precautions

- Confirmed (or suspected) patients must wear surgical (or medical-grade) masks outside the negative pressure isolation room.
- Medical personnel who treat confirmed (or suspected) patients should wear personal protective equipment (PPE) (full-body protective clothing or long-sleeved, disposable gloves, N95 or equivalent masks, goggles or face protection) to avoid direct contact with the patient's blood, body fluids, secretions and skin.
- Medical staff transporting confirmed (or suspected) patients should practice hand hygiene and wear personal protective gear (full body suit, disposable gloves, KF94 or N95 equivalent or higher mask), even facial protective gear or goggles if there are severe respiratory symptoms such as coughing and phlegm.

○ Practice hygiene procedure listed in the following diagram, before and after contact with a confirmed (or suspected) patient.

| Before patient contact (order) | Patient contact | After patient contact (order) |
|---|---|---|
| 1) Hand hygiene<br>2) Don gown(full body protective suit)<br>3) Wear KF94, N95 or equivalent respiratory protection equipment<br>4) Don goggles (or face shield)<br>5) Wear gloves | | 1) Doff gloves and gown<br>2) Hand hygiene<br>3) Doff goggles (face shield)<br>4) Doff mask<br>5) Hand hygiene |

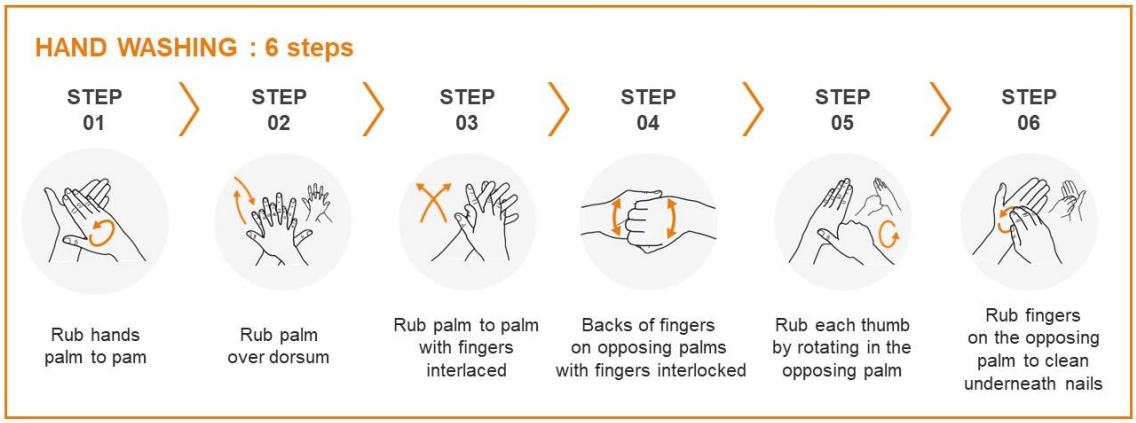
**2) Hand hygiene**

○ Hand hygiene is carried out before and after direct contact with patients or with the patients' blood, body fluids, secretions, excrement or other contaminants, as well as all the patients' surrounding environment.

○ If contaminated, disinfect with water and soap. Otherwise, alcohol hand sanitizer can be used.

○ Hand hygiene should be carried out for 40-60 seconds using water and soap, and 20-30 seconds using alcohol hand sanitizer.

○ 6 steps for hand washing (see diagram)




**3) Personal Protective Equipment (PPE)**

○ All equipment and devices should be used once and thrown away.

○ PPE should not be donned in the hospital room but should be fully donned in a separately prepared space (anterooms) and checked once again before entering the room.

○ After doffing PPE, it should be collected properly to prevent exposure to outsiders.

○ Order of donning and doffing PPE

| Donning PPE | | Doffing PPE | |
|---|---|---|---|
|  | 1. Prepare PPE. |  | 1. Roll the outer side of the gown inside and take care to avoid contaminating the body. |
|  | 2. Wear the gown first. |   | 2. For doffing only the gloves, remove the glove on the other side with one hand, hold it in your hand, and carefully doff the remaining glove and throw it away. |
|  | 3. Wear a KF94, N95 or equivalent mask. |  | 3. Hand hygiene. |
|  | 4. Press the nose contact area of the mask with your finger to keep it close. |  | 4. Remove the goggles or the front of the faceguard without touching it. |
|  | 5. Grab the mask with both hands and check for leaks while inhaling/exhaust. |  | |

6. Wear goggles or face guards.

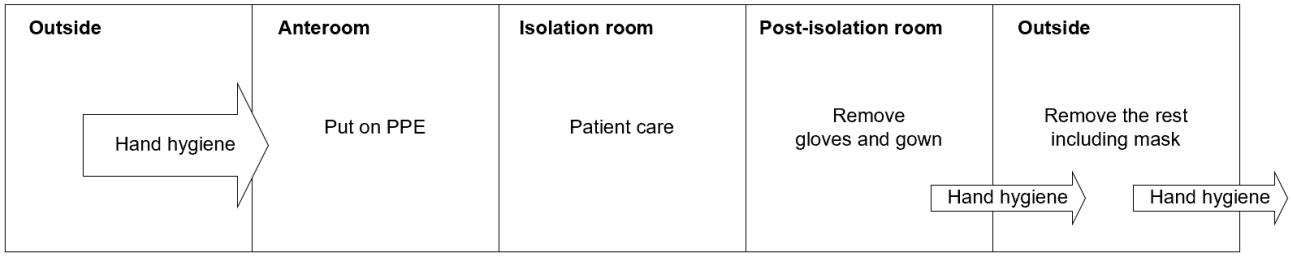
5. Remove the mask.

7. Wear gloves and be careful to cover the sleeves. (In some cases, another pair of gloves may be worn.)

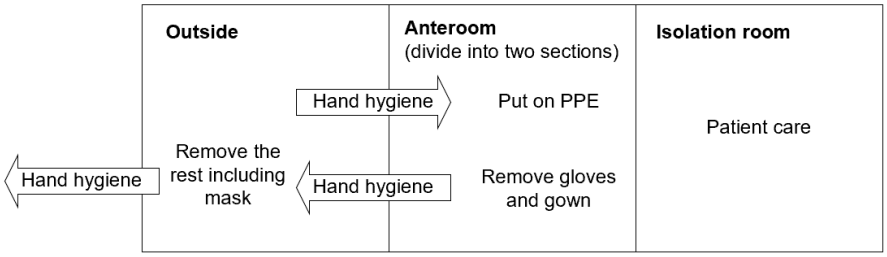
6. Hand hygiene.

❖ Double-gloves can be removed in the order of taking off gloves, taking off gowns, and finally taking off gloves by adjusting the straps of gowns.

**<Hand Hygiene Practice and Donning/Doffing of Personal Protective Equipment (PPE)>**




1) “Anteroom – isolation room – post-isolation room” model




2) “Anteroom – isolation room” model

### 4) Managing aerosol generating procedures

○ Aerosols can be generated in the case of bronchoscopy, sputum induction, tracheal intubation, cardiopulmonary resuscitation, open guiding of airways, nebulizer, etc. Clinically and epidemiologically suspected COVID-19 patients (travel history, contact history) are prohibited

from being treated with nebulizer when visiting the emergency room, and if necessary, they are conducted in the isolation room.

- In principle, aerosol generating procedures should be performed in a negative pressure isolation room with HEPA filters installed. In inevitable cases, the hospital department should seek cooperation so that it can be carried out in an isolated room with good air ventilation conditions.
- Medical staff participating in aerosol generating procedures should wear PPE (full body protective clothing, KF94 or N95 equivalent masks, gloves, hat, goggles or face protection). If available, a Powered Air-Purifying Repeaters (PAPRs) can be used instead of a mask.
- When performing aerosol generating procedures, the door must be closed, and the door must not be opened except for necessary access.
- After aerosol generating procedures have been performed, medical personnel without PPE will be able to use the room after sufficient release of aerosols into the outside (only 1% of aerosol will be left after 30 minutes based on 12 air cycles per hour), and the surfaces should be disinfected (follow environmental disinfection guidelines).

**5) Ventilator-related treatment in the event of an intensive care**

- Use a ventilator with a high-efficiency filter, and use disposable items as much as possible for consumables.
- Use a closed suction system.

**< COVID-19 PPE recommendation by situation >**

| Situation | PPE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Respiratory protection | | | Body protection | | | Eye protection |
| | Surgical mask | KF94, N95 or equivalent | Electronic respirator | Disposable gloves[1] | Disposable waterproof long-sleeved gown | Coveralls including shoe covers | Goggle/ face shield |
| POE screening (epidemiological investigation) | | ● | | ● | | ● | ● |
| Screening center: administrative staff | | ● | | ● | ● | | |
| Screening center: clinical staff | | ● | | ● | ● | | ● |
| Transport (ambulance driver)[2] | | ● | | ● | | | |
| Transport (quarantine officer, PHC personnel, EMT, etc.) | | ● | | ● | | ● | ● |
| Ambulance disinfection | | ● | | ● | | ● | ● |
| Suspected patient care: entering room, evaluation, nursing | | ● | | ● | ● | | ● |
| Aerosol-inducing procedures[3] | | ● | | ● | ● | | ● |
| Examination: X-ray and other imaging | | ● | | ● | ● | | ● |
| Respiratory specimen collection | | ● | | ● | ● | | ● |
| Specimen handling (laboratory, etc.)[4][5] | | ● | ● | ● | ● | | ● |
| Specimen transport (in intact package) | | | | ● | | | |
| Dead body transport | | ● | | ● | | ● | |
| Patient room cleaning and disinfection | | ● | | ● | ● | | ● |
| Healthcare waste disposal and handling | | ● | | ● | ● | | ● |
| Healthcare waste transport | ● | | | ● | ● | | |

***** Source: Coronavirus Disease 2019 Response Guidelines for Local Governments (Edition 7-3), KCDC, 2020

[1] Double glove while examining, treating, nursing, testing, or cleaning around confirmed (or suspected) patients to mitigate the risk of exposure from glove perforation.
[2] If driving an ambulance without a barrier separating the driver seat from the patient compartment, wear a full-body suit, shoe cover, KF94-equivalent respiratory protection equipment, and gloves and wear goggles/face shield if necessary.
[3] Aerosol-inducing procedures refer to endotracheal intubation, CPR, bronchoscopy, tracheostomy care, autopsy, continuous positive airway pressure (CPAP) therapy, nebulizer therapy and other procedures for expectoration.
[4] In specimen-handling labs or exam rooms, refer to guidelines from the KCDC Biological Safety Board for PPE choice, use, and maintenance.
[5] If working in Class II biological safety cabinet (BSC), wear a long-sleeved gown and disposable gloves.
Lee H, Ki C-S, Sung H, et al. Guidelines for the Laboratory Diagnosis of Middle East Respiratory Syndrome Coronavirus in Korea. Infection & chemotherapy. 2016;48(1):61-69.)

## 3. Testing Management

### 1) Image test

- Conduct an image test using a mobile camera.
- Image test using a mobile imaging device.
  - A radiographer should perform hand hygiene and wear PPE (protective clothing, disposable gloves, N95 mask, goggles or face protection) before conducting a test.
  - Remove PPE in accordance with the procedure after the test.
  - Disinfect mobile imaging devices according to the instructions (see **Section III - Subsection 8. Disinfection of equipment**) in the area of contact with the patient.
- Image tests conducted in a filming room such as CT and MRI, if the patient needs to be transported for imaging in the studio. (See **Section III - Subsection 7: Patient Transport** within this document.)
  - The medical staff who transport patients should practice hand hygiene and wear PPE (including protective clothing, disposable gloves, N95 masks, coughs, and goggles or facial protectors when respiratory symptoms are severe) in accordance with the guidelines.
  - After the image test, disinfect and clean the laboratory in accordance with the instructions (See **Section III - Subsection 9: Cleaning and Environmental Management** within this document.)

### 2) Laboratory test

- For COVID-19 laboratory test management (specimen collection, request, transport, execution, etc.), refer to **"Coronavirus Disease 2019 Response Guidelines for Local Governments."**
- Recommendations in the test room
  - Using PPE
    - Wear disposable gloves, masks [N95, KF94 or above-class breathing equipment (PAPR, etc.)] and gowns (full body suit) when handling specimens. Wear goggles (either goggles or face protectors when wearing glasses because normal glasses are inappropriate for eye protection) when opening the specimen container.
    - After completing the tests, take off all PPE and wash hands before leaving the testing area.
  - Work that may generate aerosols should be carried out within the bio-safety cabinet (BSC, Class II or higher).
    - When inserting or removing centrifuge tubes from buckets and rotors for centrifugation, use safety buckets and sealed rotors, etc.

  - After handling specimens, disinfect the laboratory and workstation using appropriate disinfectants.
- Minimize unnecessary contact with specimens when handling them outside the BSC.
- After handling of the specimen, disinfect the inside of the BSC with 70% alcohol or appropriate disinfectant.
- Use disposable consumables for infectious specimens. Dispose of all (potentially)

**< Precautions for Specimen Handling and Laboratory Management >**

○ **Precautions for handling specimens**

- All clinical specimens should be considered as potential sources of infection, and medical staff involved in the collection or transportation of clinical specimens should minimize exposure to pathogens.
- Medical staff performing specimen collection should wear proper PPE.
- The transport of specimens should be carried out by a person who has received safety training and is well aware of biological safety procedures and decontamination procedures in the event of leakage of specimens.
- The laboratory complies with the bio-safety rules according to the grade of biosafety facilities.
- Transfer of specimens in healthcare facilities or test institutions should be done by a person and not by post.

○ **Precautions for laboratory management**

- Appropriate PPE such as respiratory protective gear (KF94, N95 or equivalent), disposable gloves, disposable gowns (full body protective clothing), and eye protective equipment (goggles or facial protective gear) should be worn.
- **The following tasks for handling infectious substances are carried out in Class II BSC in a laboratory (Biosafety Level 2, BL2).**
  - Packaging or opening of the first container of the specimen (injection in vessel, sealing, disinfection)
  - Agitating or transferring specimens to another container and shredding
  - Diluting and pipetting specimens that are not inactivated
  - Specimen inactivation (add of a solution or an inactive agent for nucleic acid extraction)

    * Inactive specimens can be handled outside the BSC.
  - Laboratory testing without virus (*in vivo or in vitro*) cultivation

- Injecting specimens on the culture medium of bacteria and fungi
- Extracting nucleic acid from potentially infectious specimens
- Preparation of chemical fixation or heat fixation for microscopic analysis
- Putting or removing centrifuge tubes into buckets and rotors
  * Use of safety buckets and sealed rotors when using a centrifuge
- Handling of human tissue specimen that are activated or non-fixed
  * Wear BL3 level PPE due to high virus concentration
- Clinical tests for diagnosis or hematological analysis

– **Below procedures including handling of inactive specimens should be carried out in a laboratory with a level 2 of biosafety level (Biosafety Level 2, BL2).**
  - Molecular biological tests, serological tests, biochemical analysis, antigen detection tests using inactive specimens
  - Cultivation of bacteria and fungi and related analysis (routine analysis)
  - Electron microscopy of heat-fixed or chemical-fixed specimens
  - Packing of specimens for transport that require further testing (subject to the first batch with completed disinfection)

– **Experiments that require direct handling of SARS-CoV-2, such as virus cultivation, should be carried out in Biosafety Level 3 (BL3)**

  * Refer to the “COVID-19 Guidelines: Laboratory Biosafety Manual COVID-19 Response Laboratory Biological Safety Guide (20.2.27) for the detailed criteria.

– Disinfection of the laboratory and equipment
  - Disinfection is done using appropriate disinfectants such as 70% ethanol, 0.5% hydrogen peroxide, or sodium hypochlorite (0.1% chlorine concentration, 1,000 ppm) for one minute, or other general disinfectants for virus.

  * Disinfectants authorized by the Ministry of Environment can be used, and users should comply with manufacturer’s recommendation, such as disinfectant dilution ratio, contact time, and handling precautions.

* Source: “Response manual for MERS-CoV(‘20.1)” and“COVID-19 Guidelines: Laboratory Biosafety Manual (20.2.27)”

## 4. Inpatient Management

### 1) Day-to-day guidelines

- Inpatients should not go out or leave their room during hospitalization.
- Blood, body fluids, secretions and excretions of inpatients should be thoroughly processed so as to prevent infecting other people. Contaminated items should be disinfected.
- Disposable equipment is recommended for medical use wherever possible. Non-disposable equipment such as stethoscopes, thermometers should be unshared with other patients.
- Respiratory secretions (saliva, sputum) that are highly-transmissible body fluids should be disposed of in lidded containers.

### 2) Dishware and eating utensils

- Use disposable dishware and eating utensils and dispose of as healthcare waste.
- If not available to use disposable wares, disinfect the utensils used, avoiding contaminating surroundings.

### 3) Hospital bed assignments

- Place a confirmed or suspected patient in a single-bed, negative pressure room with own bathroom*.

  * Refer to the **Appendix 7. Patient Severity Classification and Hospital Bed Assignment Protocol** of “Coronavirus Disease 2019 Response Guidelines for Local Governments (Edition 7-3)”.
- Post the ‘contact and droplet precaution’ sign at the entrance.
- Perform aerosol-generating procedures (i.e., nebulizer, induced sputum collection) in negative pressure rooms following the airborne precautions.
- Place alcohol-based hand sanitizers, a hand basin, other supplies for hand hygiene, and healthcare waste containers in a room.

## 5. Staff Management

- All healthcare workers are provided with instructions on infection prevention/management and comply with the infection control guideline.
- Secure sufficient human resources, considering the level of proficiency and fatigue.
- Place other employees in the positions, prior to those with underlying medical conditions [i.e., Diabetes, chronic respiratory diseases, chronic cardiovascular diseases (except hypertension), chronic renal diseases, chronic liver disease, immunosuppressed patients] and pregnant women.

- Monitor any respiratory symptoms of the employees for 14 days after the last contact with confirmed patients.
- Check fever and any respiratory symptoms of the employees contacting confirmed/suspected cases twice a day. If those are observed, restrict them from returning to work.
- Prevent the symptomatic employees from contacting others, restrict their work, and establish treatment plans.

## 6. Families, Visitors and Caregivers

- In principle, visitors to confirmed/suspected patients are not allowed.
- When a visit to an isolation room is inevitable, visitors should wear PPE and receive training on how to use PPE and hand hygiene.
- Visitors with acute respiratory symptoms are prohibited.
- All visits must be recorded in the visiting log.
- Healthcare personnel should instruct patients, caregivers and visitors on the hand hygiene and cough etiquette. Posters with these instructions should be placed at hospital entrances and conspicuous areas.

**< Respiratory hygiene/cough etiquette >**

- Cover a mouth and nose with tissue when coughing or sneezing and dispose of them right after. Without tissue, use the sleeve instead.
- Wear a mask and turn away from other people when coughing/sneezing.
- Keep at least 1m distance with other patients

- Provide instructions and supplies for hand hygiene in outpatient waiting areas and wards.
- Inform the patient's family and visitors of up-to-date guidelines and instructions on the isolation period and hand hygiene.
- Caregivers whose patients are under the droplet and airborne precautions must receive training in the appropriate use of PPE and wear them at the same level as a healthcare personnel.
- Only allow inevitable visits and minimize visitors during the visit.
- Caregivers who have visited China in the past few days are subject to monitoring for fever or respiratory symptoms (i.e., cough) for 14 days. If any symptom appears, they must be excluded from work immediately.

## 7. Transfer of Patients

This section refers to the movement/transport of confirmed/suspected patients with fever and respiratory symptoms.

### 1) Transfer within the facility

- Transfer patients minimizing the exposure of respiratory secretions via droplets or contacts.
- Put a surgical or medical-grade mask on a patient during a transfer. Based on the risk assessment, supplement with a gown, gloves, etc.
- Clear the transferring route (restrict access or choose a quiet path).
- During transportation, a healthcare personnel with a N95 mask, gown and gloves should accompany the patient, but avoid direct contacts with the patient.
- Notify the transfer to the receiving department in advance and enable them to prepare.

### 2) Transfer to other facilities

- Consult the Local Public Health Center and transfer a patient with appropriate transportation (e.g. ambulance from public health centers).
- Consult the receiving facility about the time of transfer and patient information in advance so as to enable them to prepare.

## 8. Disinfection of Equipment

Use disposable equipment wherever possible. Do not reuse single-use products (e.g., oxygen masks, nasal prongs, suction tubes/lines). Follow the guideline below to disinfect the used reusable equipment.

### 1) Washing

- Equipment contaminated with blood, body fluids, secretions and excretions after use should be transported to designated cleaning areas and processed, avoiding contaminating surroundings.
- Designated cleaning areas should be separated from the space used by other patients. Completely submerge and wash used equipment avoiding splashing.
- Thoroughly clean to remove all blood, body fluids, secretion and excretion residues.
- Cleaning staff must wear KF94 or N95 masks, a waterproof long sleeve gown, goggles or face shields, hat, shoe covers or rubber boots, disposable double gloves (outer gloves should be rubber gloves).

### 2) Disinfection and sterilization

- Choose an appropriate disinfection/sterilization method based on the criticality specification of each item: apply low-level disinfection to non-critical items; high-level disinfection or sterilization to semi-critical items; and sterilization to critical items.
- The criticality specifications and methods are described in **“Table 2. the methods of disinfection and sterilization” in Section III - Subsection 9. Cleaning and Environment Management**.
- The disinfectant manufacturer's recommendations must be checked. Comply with the instructions regarding the level of dilution, contact time, indicated expiration date and effective concentration measurement.

## 9. Cleaning and Environment Management

### 1) General principle

- Cleaning/Disinfecting staff should receive training on infection prevention.
- Staff should put on the appropriate PPE [KF94 or N95 masks, a waterproof long sleeve gown, goggles or face shields, shoe covers or rubber boots, disposable double gloves (outer gloves should be rubber gloves)] while cleaning or disinfecting.
- Wipe the surfaces before environmental disinfection as it cannot be properly disinfected in the presence of organic residues on the surface.
- Clean with a cloth soaked in a cleaning solution or disinfectant, instead of vacuuming or mopping that are likely to cause aerosolization of pathogens.
- Instead of spraying disinfectants, rub environmental surfaces thoroughly with a clean cloth soaked with disinfectant or commercial disinfectant wipes.
- To the extent possible, use disposable disinfection tools or use the tools exclusively for disinfection. When reusing the cleaning tools, disinfect them with an appropriate disinfectant and store dry.

## Table 2. Methods of disinfection and sterilization

| | Sterilization | High-level disinfection | Intermediate-level disinfection | Low-level disinfection |
|---|---|---|---|---|
| **Equipment** | Critical items | Semi-critical items | Some of semi-critical and non-critical items | Non-critical items |
| **Contact time** | Depends on the sterilization procedure (see below) | 12-30 mins at higher than 20℃ | More than 1 min | More than 1 min |
| **Types and procedures** | Heat sterilization: steam or hot air† (Steam sterilization processing time from 3 - 30 minutes) | Glutaraldehyde-based formulations (1.12% glutaraldehyde + 1.93% phenol, 3.4% glutaraldehyde +26% isopropyl alcohol) | Ethyl or isopropyl alcohol (70-90%) | Ethyl or isopropyl alcohol (70-90%) |
| | Ethylene oxide gas† (Generally1–6 hours processing time plus aeration time of 8–12 hours) | Ortho-phthalaldehyde (OPA) higher than 0.55% | Sodium hypochlorite (Dilute 1:500, dilute 1:50 for test-laboratory ort concentrated preparation) | Sodium hypochlorite (Dilute 1:500) |
| | Hydrogen peroxide gas plasma† (Processing time between 45–72 minutes by the internal diameter and length). | 7.5% Hydrogen peroxide | Phenolic germicidal detergent solution‡ | Phenolic germicidal detergent solution‡ |
| | Glutaraldehyde-based formulations (1.12% glutaraldehyde + 1.93% phenol, 3.4% glutaraldehyde +26% isopropyl alcohol) (caution should be exercised with temperature and concentration, 10 hours at 20–25°C) | Hydrogen peroxide/Peracetic acid mixture (7.35% Hydrogen peroxide + 0.23% Peracetic acid, 1% Hydrogen peroxide + 0.08% Peracetic acid) | Iodophor germicidal detergent solution‡ | Iodophor germicidal detergent solution‡ |
| | 7.5% Hydrogen peroxide (6 hours) | Wet pasteurization at 70°C for 30 minutes with detergent cleaning | - | Quaternary ammonium germicidal detergent solution‡ |
| | 0.2% Peracetic acid, (12 minutes at 50-56℃) | Hypochlorite, single use chlorine generated on-site by electrolyzing saline containing >650–675 active free chlorine | - | - |
| | Hydrogen peroxide/Peracetic acid mixture (7.35% Hydrogen peroxide + 0.23% Peracetic acid, 1% Hydrogen peroxide + 0.08% Peracetic acid) (3-8 hours) | - | - | - |

† See manufacturer's recommendation
‡ Follow product label for use-dilution
* Notification No.2017-101 of the Ministry of Health and Welfare (related Article. 4).

**2) Disinfectants**

- Commonly used hospital disinfectants include sodium hypochlorite (1000 ppm recommended[6][7][8]), 70% ethyl alcohol (for topical surfaces), and agents proved to be virucidal.
- When using disinfectants, follow the manufacturer's guidelines on safe usage (dilution ratio, contact time, application target, etc.), handling precautions, etc.

**< Use of sodium hypochlorite >**

- Dilution ratio: 0.1% (1,000 ppm) standard (1:50 dilute 5% household bleach)
- Dilution method (For 1mL solution): water 1,000mL, 5% household bleach 20mL
- Contact time: 10 minutes for non-porous surfaces, 30 minutes for immersion

**3) When to perform disinfection**

- Disinfect Immediately for environmental surfaces contaminated with blood, body fluids, secretions and excretions.
- Disinfect at least once a day for the space around occupied isolated rooms and more frequently for the surfaces with frequent hand contacts.
- Disinfect a room after a discharge.

**4) Disinfecting after discharge**

- Preparation
  - Develop cleaning checklists by room including staff, cleaning supplies, and a list of items.
  - Monitor a cleaning/disinfection process.
  - Designate cleaning personnel and provide training.
- Exchange used fabric items (bed sheets, curtains, fabric furniture). Discard disposable items.
- Clean visible contamination with disposable wipes or a mop before disinfecting. If necessary, use detergents.
- Environmental surface disinfection
  - Wipe all non-porous surfaces (including ceilings and lights) with disposable wipes or mop soaked with 0.1% sodium hypochlorite (1,000 ppm) or equivalent-level environmental disinfectants.
  - Items with porous surface should be replaced or immersed in the disinfection agent.

[6] Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings (ver 1), 2019
[7] Novel coronavirus (2019-nCoV) Guidance for primary care Management of patients presenting to primary care Version 5.0, 2020, NHS
[8] Novel coronavirus (2019-nCoV) infection prevention and control guidance Updated 3 February 2020. PHE

- After disinfection, ventilate the room for at least 2 hours (more than six ventilations per hour) depending on the level of contamination. New patients can be admitted after the room is assessed using the checklist.

**10. Linen and Laundry Management**

- The clean linen should be kept in separate storage areas.
- All laundry staff should receive training on infection prevention.
- Staff should put on appropriate PPE (KF94 or N95 masks, gowns, gloves and shoe covers) when processing the contaminated laundry and perform hand hygiene after doffing the PPE.

* Refer to Waste Control Act, Enforcement Regulation for Handling of Laundry in Medical institutions.

- Prevent staff and environments from being exposed to pathogens during collecting, transporting, and processing laundry.

**11. Healthcare Waste Management**

- Process healthcare waste in accordance with the related regulations.
- Separate the disposal area from the site where the healthcare waste is generated for the safe management.
- Collect sharp items such as used needles and blades into an appropriate puncture-resistant container located in the place where the sharp items are used.
- Collect non-sharp infectious waste into a non-leaking waste container and keep the lid closed.
- Dispose of patients' body fluid or excretions in a sewer in accordance with the related regulations. Take precaution to prevent contaminating environment or people during the disposal process.

**Attachment 1**

# COVID-19 Infection Prevention and Control Checklist

(For internal use of healthcare facilities)

| No | Questions | Yes | No (Completion due date) |
|---|---|---|---|
| 1 | Is there a functioning IPC program in each hospital/health care facility in the area where cases are suspected/identified/transferred? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 2 | Is the triaging system for patients with Acute Respiratory Illness (ARI) applied in the health facilities? If so, is the triage system adequate? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 3 | Are standard and/or droplet precautions applied for all patients with suspected, or a confirmed high threat pathogen? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 4 | Are airborne precautions applied for all patients who require aerosol-generating procedures? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 5 | Is there a need/plan for patient placement and transportation based on the clinical status of nCoV patient? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 6 | What isolation facilities are available for nCoV patients? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 7 | What controls are/would be in place to limit visitors of patients and require PPE for visitors of nCoV patients? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 8 | Is Personal Protective Equipment available for medical staff? Are the guidelines for the use of PPE provided? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 9 | Does a protocol/strategy for environmental cleaning and disinfection exist? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 10 | Does a system for the proper collection and disposal of nCoV contaminated medical waste exist? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 11 | Is there an infection control team responsible to follow up exposed HCWs and decide to permit a healthcare worker to resume his/her work? What policies are in place to test and isolate (if positive) HCWs in contact with patients? | □ | □ (__(yy)/__(mm)/__ (dd)) |
| 12 | Is there a strategy to deal with patient/s exposed to a confirmed nCoV patient available? | □ | □ (__(yy)/__(mm)/__ (dd)) |

❖ If there are multiple questions in a box, check 'Yes' when all are satisfied.

* Source: National capacities review tool for a novel coronavirus (nCoV) 10 January 2020, WHO/2019-nCoV/Readiness/v2020.1

# Appendix 1 COVID-19-Related Use of PPE

## 1. Objectives

To protect all workers in the healthcare setting (healthcare personnel, public health center workers, paramedics, etc.) from infection/transmission by providing information regarding rational use and selection of personal protective equipment (PPE).

## 2. Definition

Personal protective equipment (PPE): protective clothing or equipment designed to protect the wearer's body from infection

## 3. Scope of Application

All procedures related to suspected and confirmed cases, as well as close contacts of confirmed cases of COVID-19.

e.g. port-of-entry screening, transfer, epidemiological investigation, screening, patient evaluation, treatment, specimen collection or transfer, testing, surgery, handling of equipment, environmental management, and handling of human remains

## 4. Usage rules of PPE

1) As a general rule, all equipment and devices should be used once and thrown away, except for non-disposable items.
   - ○ Reusable/non-disposable equipment must be disinfected or sterilized as per manufacturer recommendations.
2) Provide instructions on the use of PPE[9]
   - ○ Appropriate selection, usage, management, and disposal
   - ○ Disinfection and storage of reusable PPE
3) Considerations for the selection of PPE
   - ○ Select and use the appropriate PPE based on type of disease, transmission route, conditions of exposure to infection (contact, splashing of droplets, Inhalation of aerosols, splashing of blood or body fluid) and purpose.
   - ○ Consider suitability and durability on the situation and action.
4) Put on PPE before coming into contact with source of infection (e.g. before contact with a patient, outside a quarantine/isolation room).

[9]Occupational Safety and Health Act, Ministry of Employment and Labor

- Follow guidelines for each item of PPE (especially the close fit of respiratory protection equipment).

5) Ensure safe removal and disposal of used PPE (designated healthcare waste container).
   - Avoid contact with surroundings other than with the patient while wearing PPE.
   - When removing PPE, avoid contaminating own body parts and surroundings.
   - Remove PPE away from source of infection (e.g. locker room outside of the isolation room).
6) Dispose of damaged or contaminated PPE; do not use or store them.
7) 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.

## 5. PPE-specific characteristics and indications for use

| Item | Hazard | Indications for use | Picture |
|---|---|---|---|
| Disposable gloves | Contact | • Hand protection<br>• Pick appropriate material given level of exposure<br>• If allergic to powder, use powder-free or nitrile product |  |
| Disposable waterproof long-sleeved gown | Blood or body fluids splashing on body or clothes | Prevents further indirect spread of pathogens via viral droplets on body and clothes |  |
| Full body protective suit (coveralls)[10] | Blood or body fluids splashing on body or clothes | Prevents further indirect spread of pathogen via viral droplets on body and clothes |  |
| Shoe covers | | | |
| Boots | Blood or body fluids splashing on shoes | Use instead of shoe covers:<br>• When floor is wet or extensively soiled<br>• Choose based on exposure risk |  |

[10] Select a suit that is proven to be effective against infectious substances. For instance, European countries use 'biohazard'-marked protective suites in compliance with the regulations, EN14126 and ASTM1671.

| | | | |
|---|---|---|---|
| Hair cap | Soiling of hair | Prevents droplets from contaminating hair |  |
| Goggles | Blood or body fluids splashing onto ocular mucous membranes | • Prevents infection of ocular mucous membranes<br>• For reuse, clean with antiviral disinfectant |  |
| Face shield | Blood or body fluids splashing onto ocular mucous membranes | − Prevents infection of ocular mucous membranes and face<br>− Depending on exposure risk, can use instead of goggles<br>− For reuse, clean with antiviral disinfectant |  |
| KF94, N95 or equivalent (or higher-grade) respiratory protection equipment[11] | Inhalation of droplets or aerosols | − Prevents inhalation of pathogen particles via nasal or oral mucous membranes<br>− Usage examples:<br>• When entering confirmed or suspected patients' quarantine/isolation room (including all healthcare workers and visitors)<br>• During sputum induction<br>• During aerosol-generating procedures<br>• When transporting suspected or confirmed patients |  |
| PAPR[12] respiratory protection equipment | Inhalation of droplets or aerosols | − Prevents inhalation of pathogen particles via nasal or oral mucous membranes<br>− Requires thorough inspection and maintenance, including regular battery charge, filter exchange, and device disinfection<br>− Check for damage and malfunction prior to use; ensure routine repair, exchange, or disposal<br>− If reuse is unavoidable, disinfect prior to reuse and storage |  |

## 6. Donning and Doffing PPE

1) How to don (put on) PPE

○ Prepare all equipment according to the 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 to prevent contamination.

– In cases of contamination or damage to PPE after putting on PPE, change PPE before next treatment or provision of care.

[11] Respirator: a device designed to protect the wearer from inhaling hazardous atmosphere and particulate matter.

[12] PAPR: Powered air-purifying respirator

2) How to doff (take off) PPE

- Remove PPE at a place safe from pathogens (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 as healthcare waste

# Appendix 2 Standard Precaution

Reference: Standard Guidelines for the Prevention and Control of Infections in Healthcare (KCDC, 2017)

## 1. General principle

- Assess symptomatic patients' transmissibility at an appropriate time.
- Apply standard precautions to all patients.
- Healthcare facilities provide healthcare workers with regular training in: Risk assessment of transmission; Appropriate use of PPE; Hand hygiene; Standard precaution.

## 2. Respiratory hygiene/cough etiquette

- Healthcare workers should give instructions to patients, caregivers and visitors on respiratory hygiene/cough etiquette.
- Display instructional posters on respiratory hygiene/cough etiquette at the entrance and other conspicuous areas.

**< Respiratory hygiene/cough etiquette >**

- Cover a mouth and nose with tissue when coughing or sneezing and dispose of them right after. Without tissue, use the sleeve instead.
- Wear a mask and turn away from other people when coughing/sneezing.
- Keep at least 1m distance with other patients

- Provide items and instruction for hand hygiene in wards and outpatient waiting areas.
- Ensure that patients with acute respiratory symptoms and their companions comply with respiratory hygiene/cough etiquette from when entering a healthcare facility (entrances, triage areas, reception desks, waiting areas, etc.).

## 3. Transfer and bed assignments

- Assign single-bed rooms to patients with high transmissibility.
- With a limited number of single-bed rooms, determine the priority considering the following:
  - Possible infection routes
  - Presence of other infections requiring additional precautions
  - Level of environmental contamination and setbacks in following precautions
  - Whether to handle the patient's excretions and secretions
  - Possible impact if spread to other patients
  - Alternative plans to share a room
- Restrict (inter- and intra-) hospital patient transport unless it is medically necessary.

**4. Equipment management**

- Establish policies and guidelines for the installation, transport and management of patient-care equipment and instruments/devices that may be contaminated with blood or body fluids.
- Wear appropriate PPE depending on the level of expected contamination, when handling patient-care equipment and instruments/devices that may be contaminated with blood or body fluids.

**5. Environment management**

- Establish policies and guidelines for cleaning based on the level of contact and the degree of contamination.
- Frequently clean and disinfect items and surfaces that are close to and frequently touched by patients as those are likely to be contaminated with pathogens.
- Hospital environment must be visibly clean. Ensure that unnecessary items/devices are not placed and keep the surfaces of items or environment clean without dust or dirt.
- Use officially approved disinfectants, in accordance with the manufacturer's instructions.
- If there is a high risk of transmission due to contamination despite the use of disinfectants, consider the likelihood of resistance and the replacement with other disinfectants.
- Establish guidelines/policies for regular cleaning and disinfection of facilities or toys for children.
- Consider the following to establish guidelines and policies for the management of toys in common areas.
  - Select toys that are easy to clean and disinfect
  - Do not provide furry toys
  - Clean and disinfect large fixed toys at least weekly and whenever noticeably dirty
  - If toys are put to a mouth, disinfect and wash out thoroughly
  - When cleaning and disinfection of toys are required, perform immediately or keep them in separate containers with designated labels
- All healthcare personnel should be trained on the importance of maintaining a hygienic and safe medical environment and be responsible for cleaning and decontamination of the environment and equipment.
- Raise the level of cleaning when the association between the environmental contamination from pathogens and the transmission of the infection is suspected.

# Reference

Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected Interim guidance 28 January 2020, WHO/nCoV/Clinical/2020.2

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## Disclaimer

The English version is an unofficial translation of the original in Korean for information purposes only. In case of a discrepancy, the Korean original will prevail.

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To maintain consistent terminology in related guidelines, this document used the following source as reference for the glossary and overlapping contents:

“Coronavirus Disease 2019 Response Guidelines for Local Governments,” KCDC, translated by the COVID Translate Project (www.covidtranslate.org), accessed 24 April 2020.



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