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Healthcare organization management — Pandemic response —Guidelines for respiratory infection prevention and control in hospitals

Management des organisations de soins de santé — Réponse en cas de pandémie — Lignes directrices relatives à la prévention et au contrôle des infections respiratoires dans les hôpitaux

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Foreword

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This document was prepared by ISO/TC 304, *Healthcare organization management*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In the wake of the COVID-19 pandemic, guidelines have become necessary to prevent cross-contamination of the respiratory tract that can occur in hospitals in a disaster situation where a respiratory infectious disease has occurred. Therefore, this document was written to prevent cross-contamination in hospitals due to the outbreak of common respiratory infectious diseases.

This document is intended to standardize the guidelines for the separate operation of wards dedicated to respiratory infectious diseases; transportation of confirmed cases; and cleaning, disinfection and waste management, etc. in order to prevent respiratory cross-infections under emergency situations caused by respiratory infectious diseases such as COVID-19.

Healthcare organization management — Pandemic response —Guidelines for respiratory infection prevention and control in hospitals

1 Scope

This document provides guidelines to prevent cross-infections within a hospital, with a specific focus on the separate operation of wards dedicated to highly contagious respiratory infectious diseases, transportation of confirmed cases of highly contagious respiratory infectious diseases, disinfection, waste management, etc.

This document applies to the following:

a) separate operation of wards dedicated to highly contagious respiratory infectious diseases;

b) transportation of confirmed cases of highly contagious respiratory infectious diseases and roles of the dedicated healthcare team in a ward dedicated to highly contagious respiratory infectious diseases;

c) cleaning, disinfection, and waste management.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
coronavirus
virus that is part of a large family of viruses that can cause illness in animals or humans

Note 1 to entry: In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The coronavirus discovered in 2019 causes the coronavirus disease COVID-19.

[SOURCE: ISO 5472:2022, 3.3]

3.2
infectious disease patient
person who has tested positive in a diagnostic test for an infectious disease

3.3
negative pressure room
room in which the air pressure differential between the room and the adjacent indoor airspace directs the air flowing into the room (i.e. room air is prevented from leaking out of the room and into adjacent areas such as the corridor)

[SOURCE: ISO 5472:2022, 3.8]

3.4
internal corridor
corridor inside the negative pressure isolation area, which connects a patient room anteroom, corridor anteroom, personal protective equipment (PPE) *doffing room* (3.5), *waste disposal room* (3.6), *equipment storage room* (3.7), etc.

3.5
doffing room
space connected to the *internal corridor* (3.4), where healthcare workers who completed medical treatment take off their PPE before entering the general area

3.6
waste disposal room
space connected to the *internal corridor* (3.4), where medical waste generated from treatment of inpatients is sterilized or stored before discharge

Note 1 to entry: The waste disposal room is set to maintain a negative pressure lower than the internal corridor and a high temperature autoclave can be installed, if necessary.

3.7
equipment storage room
space connected to the *internal corridor* (3.4), where mobile equipment used for the treatment of *infectious disease patients* (3.2), etc. is stored or disinfected after use

3.8
HEPA filter
high efficiency particulate air filter
retentive matrix having a minimum particle-collection efficiency of 99,97 % (that is, a maximum particle penetration of 0,03 % for 0,3 µm particles)

Note 1 to entry: See Reference [4].

[SOURCE: ISO 5472:2022, 3.6, "high efficiency particulate air filter" has been changed from a preferred term to an admitted term; note 1 to entry has been added.]

4 Separate operation of a ward dedicated to respiratory infectious diseases

4.1 General

A ward dedicated to respiratory infectious diseases refers to a unit that is established in order to prevent the infection of other patients and healthcare workers in the process of treating respiratory infectious disease patients, etc. and to suppress the transmission of causative pathogens in the local community. In principle, a negative pressure room should be operated as a single-occupancy room to curb the spread of infectious agents within a hospital through droplets or the air. See Annex A.

4.2 Principles of isolation room assignment and operation

4.2.1

In principle, isolation rooms in a ward dedicated to respiratory infectious diseases should be operated as a single-occupancy negative pressure room, with the aim to prevent the circulation of air from isolation rooms occupied by confirmed cases to other areas within a hospital.

a) When no negative pressure room is available, it is necessary to prevent the circulation of air from isolation rooms occupied by confirmed cases to other areas within the hospital as best as possible.

   The criteria for air handing units (AHU) and heating, ventilation and air-conditioning (HVAC) system are as follows (see Annex B): because the default is to circulate a mix of outside air (30 %) and inside air (70 %), the opening rate of AHU is adjusted to prevent air mixing and to switch to a system with 100 % outside air supply and 100 % exhaust. In case of resource-limiting settings, staff open the windows at least three times a day for more than 30 min.

b) When no single-occupancy room is available, multi-patient rooms can be used for confirmed cases in a ward that is completely separated from the routes of general patients.

4.2.2

Suspected cases are assigned single-occupancy negative pressure rooms in principle until testing results are released. However, when no single-occupancy negative pressure room is available, patients with confirmed cases can be admitted to separate single-occupancy rooms that meet the AHU criteria.

4.2.3

The priority for the assignment of negative pressure rooms is to firstly assign them to high-risk patients in need of medical treatment, etc. The high-risk groups in terms of the priority for room assignment are as follows:

a) patients with oxygen saturation below 90 % who require initial oxygen therapy;

b) patients with underlying diseases (chronic obstructive pulmonary disease, cardiovascular diseases, etc.).

   EXAMPLE Room assignment for confirmed cases in healthcare facilities[5].

   1) Priority is given to positive patients that are persons under investigation (PUI) or undergoing aerosol generating procedures (AGP).

   2) Each confirmed case should be assigned to a single-occupancy negative pressure room in principle.

   3) When no single-occupancy negative pressure room is available, a confirmed case should be assigned to a multi-patient negative pressure room.

   4) When no multi-patient negative pressure room is available, a confirmed case should be assigned to a regular single-occupancy room.

   5) When no regular single-occupancy room is available, a confirmed case should be assigned to a regular multi-patient room (a minimum distance of 1 m is recommended between beds).

   6) When no regular multi-patient room is available, confirmed cases should be assigned to all rooms on a single floor in the facility.

   The conditions for 3), 4), and 5) are as follows:

   route: in order to ensure completely separate routes between confirmed cases and general patients, a ward (or single floor) is operated independently when confirmed cases are admitted to regular rooms.

5 Transportation of confirmed cases and roles of the dedicated healthcare team in a ward dedicated to respiratory infectious diseases

5.1 Patient transportation

5.1.1 Safe patient transportation

To ensure safe patient transportation, the following should be considered.

a) A patient transportation team should be organized with a minimum number of personnel when transporting a confirmed case of a respiratory infectious disease.

b) An advance notice should be provided to the receiving healthcare facility before the arrival of a confirmed case of a respiratory infectious disease so that proper preparations are taken prior to patient arrival.

c) During the transportation of a confirmed case, any contact personnel should wear PPE.

d) An ambulance should be used that is prepared at the transportation location as a vehicle for transportation.

e) A patient should be transported on a predetermined route of the shortest travel distance and time (using designated elevators and pathways reserved exclusively for infectious disease patients).

f) When transporting a patient to a ward dedicated to respiratory infectious diseases, the route should be blocked to prevent contact with other patients or visitors.

g) The wheelchair or transportation cart used for patient transportation should be left in the ward dedicated to respiratory infectious diseases.

   Patient transportation equipment, etc. that are left in the ward dedicated to respiratory infectious diseases can be reused after being disinfected according to the infection control guidelines.

h) After transportation, PPE should be removed and disposed of according to 6.1.3; hand hygiene should be performed thoroughly[6].

5.1.2 Roles and composition of dedicated patient transportation team

The dedicated patient transportation team for confirmed cases of respiratory infectious diseases performs the roles outlined in Table 1.

Table 1 — Roles of dedicated patient transportation team for confirmed cases of respiratory infectious diseases

Category	Roles	Department or person in charge
Medical support	— Designation, cancellation, and management of hospital access and restricted areas. — Installing signs or signboards for restricted areas	Support department
	— Disinfection of surrounding environment after patient transportation, such as designated elevators, rooms, transportation route, etc.	Environmental service
	— Wearing a N95 or its equivalent or higher-grade respirator and PPE (excluding access control personnel who have no direct contact with patients and maintains a 2 m distance). — Access control of general patients, guardians and hospital staff to the transportation route before transporting confirmed cases. — Access control to reserved designated elevators.	Administration personnel in charge of access control to patient transportation route
	— Setting up a restricted area according to the hospital policies and attaching and installing signboards if necessary. — Facility management for cancellation and reoperation of restricted facilities. — Disinfection of surrounding of environment.	Administration personnel in charge of guidance on patient transportation and provision of related support
	— Wearing PPE and taking over a patient from emergency medical services (EMS) personnel. — In the case of a severe patient, a healthcare worker accompanies the patient during transportation. — Transporting a patient to an assigned room using transportation equipment (negative pressure stretcher, negative pressure wheelchair, etc.) depending on the patient's condition.	Patient transportation team (two persons per team)

5.1.3 Precautions for patient transportation

Matters related to patient transportation are at the discretion of healthcare workers; and these guidelines outline specific precautions for transportation.

a) Preparations for patient transportation

1) An ambulance should be used for patient transportation (an isolation stretcher equipped with a HEPA filter should be used, if available).

2) A patient transportation team should be organized with the minimum number of personnel (driver, health service workers, healthcare worker, etc.); it should be verified that there is no other person with the patient.

3) An advance notice should be provided to the receiving healthcare facility so that proper preparations are taken prior to patient arrival.

— the following information should be delivered when requesting patient transfer, including:

— patient condition (notable information such as severity, age, underlying diseases, dialysis status, cancer patient, mental illness, etc.);

— patient location (name of the healthcare facility, etc.);

— contact details of healthcare workers who can explain the patient's health condition.

b) Considerations for infection prevention[4][7]

1) Patient transportation personnel should wear PPE during patient transportation according to 5.1.1.

2) Aerosol generating procedures should be prohibited whenever possible and aerosol-generating clinical pattern/procedures should be reduced before arriving at the hospital.

3) Any behaviour that can lead to pathogen transmission through contact during patient transportation should be avoided, such as taking off a mask, eating food, touching the face.

4) After patient transportation, the vehicle and transportation equipment should be cleaned and disinfected, given the possibility of pathogen transmission from the patient.

c) The patient should wear a mask during transportation, with the aim to minimize exposure through the respiratory system or physical contact; the patient should wear a mask whenever possible.

d) Patient transportation personnel should wear a N95 or its equivalent or higher grade respirator, disposable long-sleeved plastic gown or protective clothing (coverall), disposable gloves, protective goggles or face shields, and surgical hat (optional), with the aim to minimize exposure through the respiratory system or physical contact.

5.1.4 Patient transportation[8]

The following guidelines should be considered for the safe and efficient transportation of patients with respiratory infectious diseases:

a) A patient should use a separate route to minimize exposure through droplets from respiratory secretions and physical contact.

b) A patient should wear a surgical mask during inter-hospital transportation.

c) A healthcare worker should accompany a patient during transportation and wear a N95 or its equivalent or higher-grade respirator or surgical mask, disposable long-sleeved plastic gown or protective clothing (coverall), disposable gloves, protective goggles or face shields, and surgical hat (optional) to avoid direct contact with the patient as best as possible.

d) In case of patient transportation to other healthcare facilities, an ambulance should be used in consultation with a local public health center.

e) Patient information should be provided to the receiving healthcare facility in advance and a departure time should be prearranged so that proper preparations are taken prior to the patient arrival.

5.1.5 Detailed handling procedures[9]

The detailed handling procedure for patients to be hospitalized and outpatients or emergency room patients is as follows.

a) Transportation of patients to be hospitalized

1) Security guards control the access of general patients, guardians and hospital staff to the transportation route designated for confirmed cases.

2) After an ambulance arrives at the predetermined location within the hospital for confirmed cases of respiratory infectious diseases, the patient transportation team (two persons per team) takes over the patient.

3) After taking over the patient, the patient transportation team (two persons per team) who wears a N95 or its equivalent or higher-grade respirator or surgical mask, long-sleeved surgical gown, disposable gloves, protective goggles or face shields, disposal long-sleeved plastic gown, and surgical hat (optional) transports the patient via the route designated for confirmed cases of respiratory infectious diseases.

4) The patient is transported to the assigned room using designated elevators exclusive or designated for confirmed cases of respiratory infectious diseases.

b) Transportation of outpatients or emergency room patients

A patient is transported to the assigned room via a shortest route using designated elevators, along with hospital staff wearing PPE.

c) The purpose of access control to a ward dedicated to respiratory infectious disease and transportation routes for confirmed cases is to prevent contamination and the spread of infections during patient transportation. The following methods apply to access control:

1) when starting to operate a ward dedicated to respiratory infectious disease, all confirmed cases who have visited the hospital's main building are transferred to the ward and then the access control line is installed during isolation treatment;

2) a notice of restricted areas is attached to the access control line;

3) when transporting confirmed cases, access to the patient transportation route is controlled for any person other than personnel from the response headquarters.

5.2 Roles of the dedicated healthcare team in a ward dedicated to respiratory infectious diseases and management of visitors (or guests)

5.2.1 Roles and composition of the dedicated healthcare team in a ward dedicated to respiratory infectious diseases

The dedicated healthcare team performs the roles outlined in Table 2, when confirmed cases are admitted to a ward dedicated to respiratory infectious diseases.

Table 2 — Roles of the dedicated healthcare team in the case of hospitalization of confirmed cases in a ward dedicated to respiratory infections

Category	Roles	Department or person in charge
General management of the dedicated healthcare team	— Selecting and deploying personnel for the healthcare team dedicated to respiratory infectious diseases. — Deliberating on isolation hospitalization of respiratory infectious diseases and general management of infection control.	Emergency response headquarters
Patient care	— Patient care. — Providing infection prevention education for patients' guardians and visitors. — Various tests for diagnosis. — Specimen tests for respiratory infectious disease patients — Imaging tests for respiratory infectious disease patients	Doctors Nurses Laboratory personnel Radiology personnel
Infection control	— Monitoring system operation in hospital. — Providing infection prevention education for hospital staff. — Developing education materials on hospital-acquired infections. — Reporting new cases.	Doctors and nurses and other healthcare workers (e.g., microbiologists, epidemiologists) specialized in infection control or infectious diseases.
Administrative support	— Purchasing and supplying PPE. — Room ventilation and sewage treatment. — Cleaning and laundry. — Meal supply. — Waste management.	Support and facilities departments

5.2.2 Management of confirmed cases and visitors (or guests) in a ward dedicated to respiratory infectious diseases

The following management of confirmed cases and visitors in a ward dedicated to respiratory infectious diseases for infection prevention should be considered.

a) PPE is worn by any hospital staff who comes in contact with patients in a ward dedicated to respiratory infectious diseases.

b) In principle, a respiratory infectious disease patient is assigned to a single-occupancy isolation room.

c) Experienced personnel with competency are placed in charge of patients in a ward dedicated to respiratory infectious diseases.

d) A minimal number of personnel is given access to isolation rooms in a ward dedicated to respiratory infectious diseases.

e) In principle, tests for an inpatient in a ward dedicated to respiratory infectious diseases are performed separately in the patient's room to limit the patient's transportation for the purpose of testing, whenever possible.

f) Designated elevators for respiratory infectious disease patients are used for transporting patients in a ward dedicated to respiratory infectious diseases, while exercising caution to prevent sharing the elevators with other patients. transportation routes are predetermined to minimize the risk of exposure of other patients and healthcare workers.

g) In principle, patients' guardians and visitors are prohibited from entering a ward dedicated to respiratory infectious diseases.

h) Visitors to a dedicated ward are limited to family members and to the minimal extent in unavoidable circumstances. under the guidance of healthcare workers, they wear and remove PPE; record their time of entry and exit, name, etc. when accessing the dedicated ward; and receive education on infection control and prevention.

i) Visitors or guests of inpatients in the dedicated ward are required to get tested for respiratory infectious diseases before visiting a healthcare facility because they are likely to exposed to the same respiratory infectious disease as that of the inpatient or infected by the inpatient.

6 Cleaning, disinfection and waste management

6.1 Disinfection of contaminated areas (rooms and equipment)

6.1.1 Precautions for disinfection [10]

The following guidelines should be considered to ensure effective disinfection of contaminated areas.

a) A disinfectant suitable for the characteristics of pathogens should be selected; the disinfectant's concentration, application duration, and expiration date, etc. should be followed according to the instructions for use.

b) The instructions for use of each product should be checked

c) The disinfectant should contact all surfaces of items subject to disinfection including the lumen.

d) Open disinfectants should be managed to prevent contamination.

e) Standards should be established for the storage and use of diluted disinfectant solutions to prevent contamination.

f) Disinfection equipment, including automatic washer disinfectors, should be regularly managed and inspected.

6.1.2 Disinfection methods

6.1.2.1 General principles

To ensure effective and safe disinfection, the following general principles should be followed.

a) Disinfection should be performed by trained personnel and dedicated personnel should be assigned to rooms in an infectious disease ward.

b) PPE [a N95 mask or a higher-grade respirator, disposable long-sleeved plastic gown or protective clothing (coverall), disposable gloves, protective goggles or face shields, surgical hat (optional)] should be worn when conducting disinfection activities.

c) A room occupied by a respiratory infectious disease patient should be disinfected on a daily basis and after patient discharge.

d) After the patient is discharged, sufficient ventilation should be ensured before conducting disinfection activities.

e) Disinfectants should be used appropriately in the hospital according to the recommendations.

6.1.2.2 Terminal cleaning and disinfection methods[5]

When disinfecting cleaning tools, environmental surfaces, non-permeable surfaces, etc. during terminal cleaning, the following methods should be followed:

a) A mop soaked in cleaning or disinfectant solution and UV disinfection system should be used, instead of a broom or vacuum cleaner, etc., in order to prevent the spraying of pathogens into the air.

b) All surfaces should be wiped down before environmental disinfection, as organic matters on environmental surfaces can hinder proper disinfection.

c) Non-permeable surfaces (including ceilings and lights) should be wiped thoroughly using disposable towels or a mop soaked in terminal disinfectant solution approved by health authorities.

d) Any permeable surface should be replaced when possible or immersed in disinfectant solution.

e) Disposable cleaning tools should be used when possible; or a set of cleaning tools should be dedicated to disinfection. If reusing a cleaning tool, it should be sterilized using the appropriate disinfectant and dried before storing.

f) After disinfection, ventilation should be performed for a minimum of two hours (air exchange rate of at least 6 times per hour) in line with the contamination level. Then, the checklist should be reviewed to ensure the completion of disinfection.[6] See Annex C.

6.1.2.3 Types and usage of disinfectants[5]

In principle, only disinfectants approved by health authorities are used.

Disinfectants used in healthcare facilities include sodium hypochlorite (1 000 ppm recommended in References [11], [12] and [13]) and alcohol (local space only); and disinfectants proven to work on viruses can be used.

— Sodium hypochlorite, quaternary ammonium compounds (QACs), and peroxygen compounds are appropriate for environmental disinfection, and H_2O_2 vapor, H_2O_2 dry mist, etc. can also be used.

— When using sodium hypochlorite, the concentration of commercially available bleach is checked and diluted to an effective concentration level of 0,1 % or 1 000 ppm (for a 5 % bleach concentration, dilute 20 ml of sodium hypochlorite with 1 000 ml of water).

— To ensure safety, these are performed by properly trained users, in strict compliance with manufacturer instructions.

— When using disinfectants, the manufacturer's recommendations are observed with regard to the dilution ratio, contact duration, handling precautions, etc.

6.1.2.4 Disinfection of patient-use areas (zones)[7]

To ensure safe disinfection of patient-use areas, the following measures should be followed.

a) In areas (zones) used by a confirmed patient, the area should be marked where the contamination is identified and contaminated materials should be sealed before cleaning and disinfecting to prevent others from being exposed to contamination.

b) Windows and/or doors should be left open for ventilation before, during and after cleaning and disinfection (at least 2 h before cleaning and disinfection).

c) PPE should be worn and the walls within arm's reach and all frequently-touched surfaces should be cleaned with a clean cloth (fabric, etc.) moistened with a diluted disinfectant solution; and after leaving

for a certain period of time, the surfaces should be wiped again with a cloth (fabric, etc.) dampened with clean water.

when using disinfectants, disinfectants are not applied by compressed spraying or fogging, only disinfectants approved by health authorities are diluted according to use recommendations, and sufficient surface contact duration with the disinfectant is ensured.

d) Decision to resume usage: After a patient is discharged, cleaning, disinfection and appropriate ventilation should be conducted before the next patient is admitted (see Table 3).

— although viruses are destroyed after disinfection activities, the precautions of each product should be considered in deciding the timing to resume the usage, as the said decision cannot be applied across the board due to the different characteristics of each disinfectant.

— in the case of disinfection using sodium hypochlorite (1 000 ppm or higher), it is recommended to ensure sufficient ventilation until the day after disinfection. When other patients are present in the room, disinfection methods using sodium hypochlorite are avoided.

Table 3 — Disinfection timing and criteria for resuming usage in hospitals and emergency rooms

Type	Disinfection timing	Criteria for resuming usage
Hospitals	— Immediately disinfecting environmental surfaces contaminated with blood, bodily fluids, secretions and excrement. — Disinfecting the environment surrounding isolated patient rooms at least twice a day, or at least three times a day for frequently-touched surfaces. — Disinfecting after a patient is discharged.	It is recommended to resume medical treatment after ventilating for at least 2 h with a minimum air change rate of 6 per hour after disinfection.
Emergency rooms	When a respiratory infectious disease patient visits an emergency room.	It is recommended to resume medical treatment after ventilating for 4 h or more under 6 to 12 air changes per hour after disinfection.

6.1.2.5 Disinfection of inpatient rooms, etc.

The following guidelines should be considered to help effective disinfection.

a) Frequently-touched surfaces should be disinfected every day, e.g. a side table, desk lamp, bed rails that are touched often, doorknobs, a phone, and the inside of a bathroom.

b) After a patient is discharged, contaminated walls, electric cords, switches, doorknobs, bed, bedsheets, wheelchair, closet, sink, toilet, etc. should be disinfected.

c) The floor should be wiped using a disinfectant.

d) The doorknob should be cleaned with a cloth moistened with disinfectant, wiped with a clean cloth, then allowed to air dry.

6.1.2.6 Disinfection of medical equipment

Disinfection of medical equipment is essential for infection prevention. The following precautions should be taken into consideration when disinfecting medical equipment.

1) Medical equipment should be disinfected such as ventilators and pulse oximeters according to the manufacturer's recommendations.

2) When using chemical disinfectants, products that are suggested in guidelines for each disease should be used, while ensuring the safety of any residual concentration towards the human body.

6.1.2.7 Disinfection of toilets and bathrooms

Disinfection of toilets and bathrooms should be performed (see Table 4)[4].

Table 4 — Disinfection of toilets and bathrooms

Items	Example disinfection methods
Toilet	— Closing the lid then flush the toilet. — After putting in a set amount of disinfectant, leaving it for 10 min, and then flushing the toilet. — Using the toilet brush to clean with a disinfectant. — Closing the lid and flushing the toilet again. — Placing the used toilet brush into a bucket filled with a disinfectant for at least 30 min, and then rinsing with water and air dry.
Sink	— Wiping the sink with a disinfectant using a general-purpose brush. — When transporting items that must be disinfected, putting them into leak-proof bags and the carrier wears PPE.
Sewage outlet	— Draining about 0,5 l of water into each outlet. — Draining a disinfectant into each outlet.

6.1.3 Precautions after disinfection[7][6]

After disinfection, the following precautions for infection prevention should be observed:

a) After completion of and disinfection work, when removing PPE, caution should be taken not to contaminate body parts and surroundings with pathogens on all PPE.

b) PPE should be removed in the proper sequence and method, while taking caution not to contaminate surroundings; and they should be immediately discarded in the designated medical waste container.

c) After taking off PPE, hand hygiene should be performed using an alcohol-based hand sanitizer or water and soap.

d) All disposable PPE used in the designated medical waste container should be discarded and sealed tightly when a certain amount is filled according to waste disposal procedures; and hands should be washed using soap and water.

   reusable protective goggles or face shields can be reused after disinfection according to the manufacturer instructions.

e) If the staff who performed cleaning and disinfection subsequently develops a fever or respiratory symptoms within 7 days after disinfection, this should be reported to health authorities.

6.2 Waste collection

6.2.1 Key measures for preventing the cross-infection of waste collectors

For waste collectors or recyclers, potential sources of exposure consist of having close contact with a coworker or member of the public with respiratory infectious diseases or contacting surfaces that have been touched or handled by a person with respiratory infectious diseases. The following key measures should be taken to protect them and slow down the spread of diseases:

a) excluding them from duties according to the guidelines of health authorities, if they are experiencing symptoms;

b) notifying their supervisor and following the recommended precautions of health authorities, if their family member or cohabitant develops symptoms of respiratory infectious diseases;

c) limiting close contact with others by maintaining a distance of at least 2 m when possible;

d) practicing regular cleaning and disinfection of frequently-touched surfaces, such as steering wheels, door handles, levers and control panels at the beginning and end of every shift and after anyone else uses a vehicle or workstation;

e) wearing normal PPE throughout the day; they can include work gloves, eye protection (safety goggles, etc.), work uniform or coveralls;

f) replacing work gloves immediately if they are damaged (e.g. if they are ripped or torn);

g) practicing proper hand hygiene and coughing etiquette; these are important infection control measures; washing hands regularly with water and soap for at least 40 s or using an alcohol-based hand sanitizer containing at least 70 % alcohol; important situations to clean hands include:

   — before and after work shifts and work breaks;

   — after blowing the nose, coughing or sneezing;

   — after using the restroom;

   — before eating or preparing food;

   — before putting on, touching or removing cloth face coverings;

h) avoiding contact with bodily fluids, if possible; using gloves when it is necessary to touch surfaces contaminated by bodily fluids;

i) avoiding touching the eyes, nose or mouth; extra care should be taken when putting on or taking off PPE.

6.2.2 Principles for medical waste disposal

All types of medical waste generated from a ward dedicated to respiratory infectious diseases as isolation medical waste should be disposed of.

Within 3 days of waste generation, waste disposal should be entrusted to a licensed waste management service provider for waste collection, transportation, and incineration.

6.2.3 Wearing PPE during waste disposal

When handling isolation medical waste, workers utilize the same PPE as healthcare workers.

6.2.4 Safe waste disposal

The following principles should be considered to help safe waste disposal such as laundry and medical waste.

a) Safe disposal of tableware, bedding, linens and laundry

   1) Tableware, bedding, and linens used by respiratory infectious disease patients are considered to be contaminated. When treating them as isolation medical waste, any waste that is wet or deemed possible to contaminate the waste container should be wrapped with plastic, while exercising caution to avoid the contamination of the waste container.

2) However, if a hospital has its own management guidelines, etc. for infectious waste including the washing or cleaning of tableware, bedding and linens, they can be followed.

b) Safe disposal of isolation medical waste (see Table 5)

1) Generation and storage

— discharge

Such waste should be inserted into a container dedicated to isolation medical waste (minimizing transportation in the hospital) immediately at the discharge site and double-seal with an exclusive bag and designated container.

Disinfection should be done before and after waste input. However, for personal protective equipment (masks, protective clothing), etc., where there is no risk of tearing the exclusive bag or leaking to the outside, a dedicated corrugated cardboard container can be used instead of a dedicated synthetic resin container.

Leftover food should be separated from confirmed cases and put into the container for isolation medical waste before disposal. However, if the entire hospital is under quarantine (joint quarantine) and it is impossible to put food waste generated into the dedicated medical waste container, it should be incinerated collectively (at an industrial waste incineration facility) after disinfection.

Washable fabrics, such as bedsheets, pillow covers, blankets, should be reused after cleaning in a washing machine using warm water or disinfectant according to the guidelines of health authorities.

— storage

The relevant waste should be discharged on the same day of its generation and its storage duration in the hospital should be minimized.

When storing such waste within the hospital, it should be stored separately from other waste in the designated storage warehouse.

Tissue waste should be stored in a dedicated refrigeration facility; and isolation waste with no risk of decay should be kept refrigerated whenever possible, in principle.

Storage warehouses should be disinfected every day, while storing medical waste in structures that are not visible from the outside and under restricted access to outsiders.

2) Collection and transportation

— The waste is directly sent to the medical waste incinerator while packed in a designated sealed container and incinerated without passing through a temporary storage location.

— A sealed loading container is disinfected whenever the loading container is used.

3) Waste treatment

— Incineration, wet disinfection, and autoclaving should be selected and used based on the infrastructure and local conditions.

— In the case of incineration, the waste should be put immediately into the incinerator in a dedicated container immediately after receipt.

— The processing status and final disposition status should be constantly monitored together with relevant agencies.

Table 5 — Isolation medical waste management regarding respiratory diseases[14]

Storage of waste generator	Transportation	Processing
— Same-day entrusted processing (storage up to 1 or 2 days). — Refrigerated storage in principle. — Disinfection before and after using a dedicated container.	— Prohibition of temporary storage, same-day transportation. — Disinfection of vehicles with disinfectants after each usage.	— Same-day incineration processing.
In the case of an island area that is not connected to land, waste can be stored separately (up to 4 days) in consideration of its characteristics, but should be transported and processed promptly (up to 2 days).		

Annex A
(informative)

Facility standards for isolation rooms in a ward dedicated to respiratory infectious diseases

A.1

Negative pressure room are rooms at negative pressure relative to the surrounding areas, and with a minimum of 12 ACH (air change per hour). Isolation rooms in a ward dedicated to respiratory infectious diseases are special facilities within the hospital that must be smoothly connected to existing hospital facilities in terms of their functionality.

A.2

An independent route should be secured in order for infectious disease patients, etc. to have direct access and entry from the outside to the negative pressure isolation area without passing through other departments.

a) If infectious disease wards are placed on the second floor or above, a designated elevator should be installed to secure a separate route for patients that is separate from those used by healthcare workers and clean items.

b) A canopy should be installed with sufficient height and area at the exclusive entrance in anticipation of rain, etc.

A.3

The route of healthcare workers is set by dividing into an entry route (buffer zone) into the negative pressure isolation area and an exit route (contaminated area).

A.4

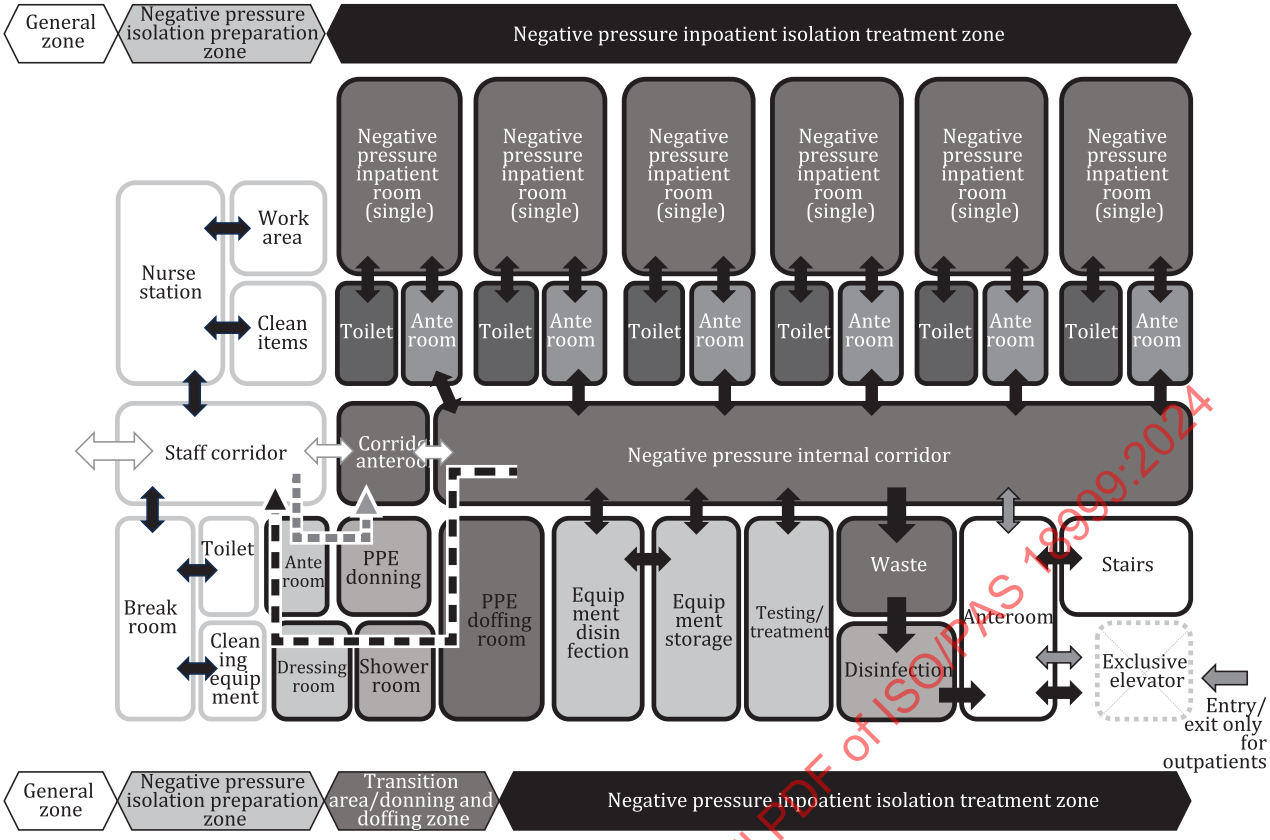
An isolation ward for respiratory infectious diseases is physically separated from non-negative pressure general areas of the hospital and divided into contaminated and buffer zones depending on functions and likelihood of exposure. See Figures A.1 and A.2.

A.5

The contaminated area should remain at a negative pressure and have a corridor anteroom, doffing room, patient room anteroom, patient room, bathroom, waste disposal room, equipment storage room, etc. A nurse station is placed in the non-negative pressure general area, with a design that allows easy monitoring of the negative pressure isolation area, if possible. See Figures A.1 and A.2.

A.6

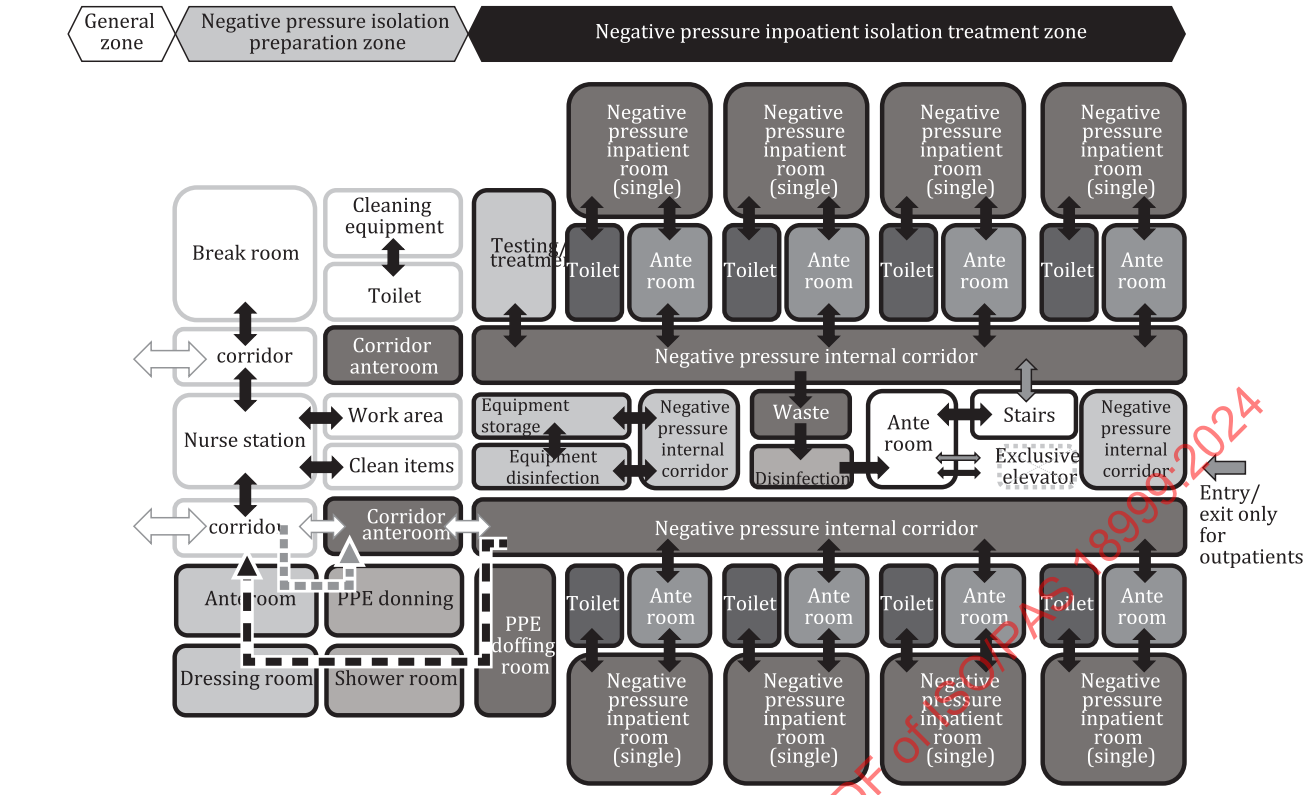
Specification about a negative pressure room and routine management are managed by the checklist.



Key

- internal route
- exclusive patient route
- route used at normal times
- entry route for healthcare workers
- exit route for healthcare workers

Figure A.1 — Example mid-corridor negative pressure isolation ward (darker colour indicates stronger negative pressure)[4]



Key

- internal route
- exclusive patient route
- route used at normal times
- entry route for healthcare workers
- exit route for healthcare workers

Figure A.2 — Example double-corridor negative pressure isolation ward (darker colour indicates stronger negative pressure)[4]

Annex B
(informative)

Ward facility management for preventing cross-infection

B.1 Principles of facility safety management

The following principles should be considered in the event of an outbreak of respiratory infectious diseases with the aim to protect healthcare workers and minimize the risk of secondary transmission into local communities.

a) In a ward dedicated to respiratory infectious diseases, isolation in negative pressure beds should be a top priority.

b) Negative pressure in the highest contamination areas (negative pressure rooms and annex rooms) remains at the highest level and a pressure difference is applied between the outside and each designated area to prevent the release of pathogens to the outside.

c) The AHU system in the negative pressure area should use 100 % outside air and exhausts to the outside to prevent air in a negative pressure room from being recirculated.

d) In order to prevent the external exposure of pathogens in a negative pressure room, all waste generated in a room should be sterilized or follow the medical waste disposal standards.

e) No air leakage should occur in a negative pressure room (floor, ceiling, wall, electrical outlet, etc.), which is designed and constructed as an enclosed structure.

f) An officer responsible for facility maintenance and management should acquire expertise in the relevant facilities and equipment and have the ability to actively respond to emergency situations.

g) An officer responsible for facility maintenance and management should receive regular training on the safety management of negative pressure isolation room facilities and apply the knowledge to actual practices.

h) An officer responsible for facility maintenance and management should be fully aware of the potential risk of pathogens being transmitted from a negative pressure room and wear PPE when performing tasks for infection prevention.

B.2 Main content of facility and equipment maintenance

The following items should be checked for maintenance of facilities in the respiratory infectious disease ward. See Tables B.1 to B.3.

a) Differential pressure control

— The suitability of manometers is inspected by checking inter-room pressure differences and the presence of any malfunctions in the manometer installed in the AHU system in a ward dedicated to respiratory infectious diseases.

— The standard operating procedure (SOP) for testing, adjusting, and balancing includes types of differential manometers, locations and methods for the installation of manometers, methods of manometer inspection, adjustment interval, etc.

b) Automatic control

— All types of equipment sensors and their connections to automatic control in a ward dedicated to respiratory infectious diseases are verified and inspected.

— The SOP for automatic control includes operation methods, inspection methods, response methods to causes of failure, etc.

c) Piping equipment

— Pipes are managed efficiently to extend their lifespans and inspected to ensure the supply of fluids and gases to desired locations.

— The SOP for piping equipment includes the classification of pipes for each usage, inspection, response methods, etc.

d) AHU

— An appropriate temperature, humidity, and cleanness of each room are verified.

— The SOP for AHU includes the structure of AHU, air flow chart of AHU, operation methods, inspection methods, causes of failure and response, etc.

e) Electrical equipment

— Power supply panels used in facilities of a ward dedicated to respiratory infectious disease are verified.

— The SOP for electrical equipment includes inspection methods, inspection items, precautions against failures, etc.

f) Wastewater treatment equipment

— Wastewater treatment equipment for wastewater generated from a ward dedicated to respiratory infectious diseases is verified.

— The SOP for wastewater treatment includes inspection methods, wastewater treatment methods, etc.

g) Emergency power supply (UPS or standby generator)

— Measures of maintenance and management of uninterruptible power supply (UPS) are described and the consistently stable supply of electric power is ensured to major facilities and equipment, even under power outage situations.

— The SOP for emergency power supply systems such as UPS includes the operation procedure, precautions for operation and maintenance, inspection methods, etc.

Table B.1 — Example periodic facility and equipment inspections

No.	Inspection items	Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.	
1	Filters of AHU and exhaust units																								
2	Lubricant replenishment in AHU and exhaust units																								
3	Motor noise and vibration of AHU and exhaust units																								
4	Fan noise and vibration																								
5	V-Belt tension and wear condition																								

Table B.1 *(continued)*

No.	Inspection items	Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.	
6	Refrigerator																								
7	Adjustment of inter-room pressure difference																								
8	Operating status of inter-room interlocks																								
9	Illuminance measurement																								
10	Airtightness of areas sealed with silicone																								
11	Water levels in wastewater and chemical tanks																								
12	Automatic control panels																								
13	Power and light panels																								
14	Communication equipment																								
15	Mechanical equipment (piping and ducts, etc.)																								
16	Fumigation																								
17	Cleaning and disinfection																								
18	Leak test of HEPA filter or equivalent filter (leak rate, integrity test (PAO))																								
19	Manometer calibration																								
20	TAB facilities																								

Table B.2 — Regular facility and equipment inspection checklist

[Regular] Inspection Checklist				
Inspection facilities	**AHU/EFU/EF/closed area/ piping equipment**	**Inspector**		**(Signature)**
Inspection date		**Confirmer**		**(Signature)**
Category	**Inspection items**	**Standard values**	**Inspection results**	**Notes**
AHU	Pressure difference of pre+medium filters (SA)	0 mmAq to 40 mmAq		
	Filter replacement	Replacement status		
	Operating status of MVD	Valve open rate (on/off)		
	AHU (SA) operation noise and vibration	Generation of abnormal noise		
	Operating status of humidifier valve	Condition of humidifier valve		
	Operating status of heater valve	Condition of heater valve		
	Operating status of cooler (dehumidifying) valve	Condition of cool water valve		
	Pressure difference of HEPA filter (EA)	0 mmAq to 50 mmAq		
	Pressure difference of carbon filter (EA)	0 mmAq to 10 mmAq		Varies depending on facility condition
	Drainage status of condensate water	Drainage status		
	Motor drive (Hz)	60 Hz or less		
EFU/EF	Pressure difference of filter	0 mmAq to 50 mmAq		
	Operating status of MVD	Valve open rate (on/off)		
	Motor drive (Hz)	60 Hz or less		
	EFU nozzle and ambient piping	Visual and valve inspection		
	Exhaust unit operation noise and vibration (EA)	Generation of abnormal noise		
Closed area	Status and adjustment of pressure difference between workrooms	-2,5 Pa		
	Wind volume/wind speed of HEPA filter (recovery ventilation)	6 times or higher/hr		Automatic control system
	Warm water	(23 ± 3) °C		Automatic control system
	Humidity	(50 ± 10) %		Automatic control system
	Airtightness of areas sealed with silicone	Sealant damage status		
	Door interlock	Door and window open test		
	Access control equipment	Checking its operation		
	Hand sanitizer	Checking its operation		Varies depending on facility condition
	Vibration condition	Operating status		