

Design Guideline for

# COVID-19 ISOLATION CENTER

Version 1.0 | 15 April 2020

Prepared by



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INSTITUTE OF ARCHITECTS BANGLADESH

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## Disclaimer

The views, thoughts, and opinions expressed in the text belong solely to the author and the respective editor, and not necessarily to the Institute of Architects Bangladesh (IAB).

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# FOREWORD

Amidst the outbreak of Coronavirus (COVID-19) Pandemic in 2020, like many countries of the world, Bangladesh is in a stage of establishing a number of Isolation facilities to serve a huge number of patients. Institute of Architects Bangladesh (IAB) has taken an initiative to prepare a basic design guideline of Isolation Center for local architects. This document intends to translate the knowledge and experiences in controlling the spread of coronavirus in an Isolation Center for treating the suspected and confirmed COVID-19 patients.

It is based on literature review and prepared by health care design expert:

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## GLOSSARY

**Isolation Center:** Isolation center can be defined as an independent healthcare facility operating separately from other hospital resources, which specifically equipped for the treatment of infectious diseases. There are various facilities in place including a specific entrance for the patient, triage area for separating suspected and confirmed patient, a diagnostic facility and dedicated laboratory for carrying out tests, a isolation patient treatment room/ward, medical staff area decontamination area, removal of waste disposal area, laundry, kitchen, all of which help to ensure the patient can be treated safely and securely.

**Isolation Unit:** Isolation Unit within an Isolation Center is a patient care unit where patients with suspected or confirmed COVID-19 should be cared for in a clinical environment that provides safe, secure, and appropriate care with optimal infection containment, prevention, and control procedures. Isolation unit is located in high-risk zone, which includes patient treatment area, diagnostic facility, and ancillary facility for patient care.

**Isolation Room:** An Isolation room is a patient treatment area that aims to control the airflow in the room so that it can ensures cross-infection of other people within an Isolation center.

**Triage area:** a critical point of area separating persons suspected of having COVID-19 coronavirus from persons without COVID-19. Triage is performed either before arrival or upon arrival at the Isolation.

**Anteroom:** A small room leading from a corridor into an isolation room to provide a controlled environment and barrier against entry/exit of contaminated air into/out of the isolation room when the door is opened. Each anteroom must have self-closing doors and sufficient area to allow for the donning or removal of personal protective equipment or clothing.

**High Risk Zone:** Based on the risk of virus transmission, the high-risk zone is the area for patients who either have or are suspected to have coronavirus disease. Medical Staffs need to don (put on) PPE before entering into the high-risk zone.

**Low Risk Zone:** Based on the risk of virus transmission, the low-risk zone is medical staff-only area which is for doctors, medical staff, cleaning staff, water and sanitation, and logistics staff. Medical Staffs need to doff (put off) PPE before entering into the high-risk zone.

**High Acuity patient:** Patients, who have confirmed COVID-19 positive and are severely ill, receive higher acuity ratings. High-acuity patients often present challenging medical conditions, and they often have significant, unpredictable needs. High-acuity patients need frequent observation to ensure that they improve or remain stable. As a result, high-acuity treatment room must maintain higher staffing levels.

**Low Acuity patient:** Patients, who have confirmed COVID-19 positive but NOT severely ill, receive low acuity ratings. Low acuity patients are stable patients with more predictable outcomes, who need less frequent nursing observation than high acuity patient. As a result, low-acuity treatment room need lower staffing levels.

**Personal protective equipment (PPE):** Specialized clothing or equipment is worn to protect the health care worker or any other person from infection, including the use of particulate respirators, eye protection, gowns and gloves. In case of blood borne or airborne infections, these will include face protection, goggles and mask or face shield, gloves, gown or coverall, head cover and rubber boots.

**Negative pressure ventilation:** It is a mechanical ventilation system where the exhaust airflow rate is greater than the supply airflow rate. The room will be at a lower pressure than the surrounding areas, which keeps air from flowing out of the room and into adjacent rooms or areas.

**Natural ventilation:** Natural ventilation depends natural forces (e.g. winds and thermal buoyancy force due to indoor and outdoor air density differences) to drive outdoor air into a building or a room, and distributes the air within the building or room through purpose-built, building envelope openings. Purpose-built openings include windows, doors, solar chimneys, wind towers and trickle ventilators.

**Hybrid ventilation:** Hybrid ventilation (mixed-mode) relies on natural driving forces to provide the desired air flow rate. When natural ventilation alone is not suitable, exhaust fans (with adequate pre-testing and planning) can be installed to increase ventilation rates in rooms having patients with airborne infection.

**High efficiency particulate air (HEPA) filter:** A filter that is capable of removing 99.97 per cent of particles 0.3 µm in diameter. Filters may be used in ventilation systems to remove particles from the air, or in personal respirators to filter air before it is inhaled by the person wearing the respirator. The use of HEPA filters in ventilation systems requires expertise in installation and maintenance.

**Mucosa:** The Mucosa is a membrane that lines various cavities in the body and covers the surface of internal organs. It consists of one or more layers of epithelial cells overlying a layer of loose connective tissue. Mucous membranes line many tracts and structures of the body, including the mouth, nose, eyelids, trachea (windpipe) and lungs, stomach and intestines, and the ureters, urethra, and urinary bladder.

**Conjunctiva:** The conjunctiva is the clear, thin membrane that covers part of the front surface of the eye and the inner surface of the eyelids. The primary functions of the conjunctiva are Keeping the front surface of the eye moist and lubricated, Keeping the inner surface of the eyelids moist and lubricated so they open and close easily without friction or causing eye irritation, and Protecting the eye from dust, debris and infection-causing microorganisms.

**En-suite:** En suite is a bath room that has a toilet and comes with a shower and/or bath that is directly connected to a bedroom.

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## 1. Introduction:

One of the most pressing issues of today is the outbreak of COVID-19 coronavirus all over the world. Hospitals and healthcare facilities are struggling to accommodate the patients who are suffering from the COVID-19 coronavirus, as well as the medical professionals who treat them. Health care design research shows that the physical design of a hospital can minimize the risk of transmission of any infectious disease. This document aims to provide basic design guideline for an 'Isolation Center' for treating the suspected and confirmed COVID-19 patients, highlighting important areas to consider for infection control. The Isolation Center can be designed as an extension or renovation of an existing hospital building or as a makeshift (temporary) Isolation Center, for supporting patient care operations considering the safety of healthcare staff and patients and mitigating the spread of COVID-19 virus. This design guideline is deemed to be helpful in evaluating the layout of an Isolation Center, whether independent or part of a larger facility, in response to the need of COVID-19 virus treatment.

## 2. Understanding the Transmission of COVID-19 Virus:

Understanding infectious diseases and how they are transmitted may help architect and designer in his or her design decisions for infection control in the healthcare setting. While the transmission is not completely understood it is difficult to prioritize which infection control measures should focus on, especially in developing countries with limited resources like Bangladesh.

According to The World Health Organization (WHO), the COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes. Droplet transmission occurs when a person is in close contact (within 1 meter /3feet) with someone who has respiratory symptoms (e.g., coughing or sneezing). Within this distance, he or she is at risk of having his/her mucosa (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person. Besides transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used by the infected person (e.g., stethoscope or thermometer). Besides, according to the Center for Disease Control (CDC), COVID-19 virus can spread more efficiently between people and suggest to maintain a good social distance 2 meters (approximately 6 feet). Basic knowledge of droplet dynamics may be useful to understand the infection control criteria and to make design decisions for reducing the risk of cross-infection by droplet and direct contact. Research shows that the maximum distance for cross-transmission from droplets is approximately 2 meters around the infected individual. Therefore, 2 meters (approximately 6 feet) distance of a patient can be recommended as a precautionary approach for close contact. However, in a resource constrain condition; architect and designer can follow the WHO recommendation and maintain at least 1 meter (3 feet) distance between patients.

Human-to-human exposure barrier is crucial to preventing the COVID-19 virus from spreading. In an overcrowded health facility, it is difficult to maintain physical distancing in shared waiting areas and find a space to dedicate for isolation of suspect and confirmed cases. If our predictions of affected people are even partially accurate, our capacity for patient bed will fall short to handle the potential influx of COVID-19 Coronavirus patients. Due to limited resources, it is not possible to build a new hospital to handle the unpredictable condition. In such a situation, designing a

makeshift Isolation Center through the conversion of our community buildings like a convention center, stadium, and school or in a tent, where especially critical condition patients will be treated in existing hospitals with ICU facility, can help to treat more patients in this pandemic condition. During designing such an isolation center, at the planning stage, the following criteria and principles should be kept in mind in order to prevent the spread of COVID-19 virus in the Isolation Center:

- Patient/Staff flow pattern to minimize exposure of high-risk patients and to facilitate patient transport and staff safety;
- Adequate spatial separation of patients in waiting area and patient treatment area;
- Adequate number and type of isolation rooms (single or multi bed Isolation room);
- Appropriate access to adequate handwashing facilities;
- Surface materials (e.g. walls, floors) that can be adequately cleaned;
- Appropriate ventilation for isolation rooms.

### **3. Planning and Design of Isolation Center**

Among the various methods for infection control, two important environmental factors are isolation and ventilation. Infected patients or those highly susceptible to infection need to be isolated in private rooms with proper ventilation systems to stop the spread and reduce the possibility of developing a new infection. As COVID-19 coronavirus spread through droplet or contact transmission and droplets do not remain suspended in the air; therefore, special air handling and ventilation are not required to prevent droplet transmission. It is widely accepted that patients with infectious diseases should be placed in segregated facilities to prevent the spread of infection. Therefore, isolation of a patient is essential for preventing the COVID-19 virus from spreading in the setting of hospital or health care center. The main intention of designing Isolation Center is to offer adequate protective barriers for those who are lab confirmed COVID-19 patients and to minimize the cross infection through droplet or contact transmission. As infected patients need treatment and care, these isolation centers also extend medical support of various levels to inpatients depending on the availability of qualified staff and treatment facility.

#### **3.1 Isolation Center Planning Considerations:**

- The location and design of the isolation center within an existing facility should ideally enable their isolation from the rest of the services.
- The availability of designated COVID-19 triage areas for early detection and isolation of cases will minimize the risk of transmission in the center.
- Multiple isolation rooms should be clustered and located away from the main entrance of the department.
- Isolation units should include ample space for ancillary and support services, such as circulation areas, clean and dirty utilities, separate toilet facilities for staff and visitors, etc.
- Isolation units should include ample space for storage of patient care equipment, cleaning equipment, linen, waste, etc.
- Isolation units should be designed so that the flow of goods, services, and waste materials is such that cross-contamination between contaminated and clean items is minimized.

- Requirements of ancillary services at Isolation unit level, such as waste handling, laundry or decontamination of patient equipment, need to be considered.
- Furniture, surface finishes, and other fixtures and fittings within the Isolation unit should be easily cleaned and disinfected and designed to minimize the risk of transmission of infection.
- Frequent disinfection is necessary to the high-touch surfaces, and terminal disinfection after patient discharge from isolation facilities.
- Special environmental controls, such as negative pressure isolation rooms, are not necessary to prevent the COVID-19 Coronavirus through droplet and contact transmission. However, in the early stages where capacity allows, and in high-risk patient treatment area, patients with suspected or confirmed COVID-19 may be isolated in negative pressure rooms.
- Appropriate filtration (air filters) shall be in place at every level in the hospital as this disease concerns the respiratory system of human bodies. In the case of air-conditioned spaces, appropriate air-filters (HEPA, ULPA, etc) to prevent cross-contamination among patients, to help to keep a decontaminated hospital environment and especially at the exit-flow to prevent of contamination of the surrounding air should be placed
- An on-site kitchen to supply food to hospital staff, doctors and patients would be helpful for better operation of Isolation Center. For the well-being of patients to have proper nutritional supports and the doctors and staff to have continuous food support, it would be good to have a kitchen inside the center; otherwise, an off-site uninterrupted viable alternative could be arranged.
- On-site laundry and CSSD is very important from the viewpoint of hospital sterilization science. The management of bulk hospital linens to all medical equipment would be easy and handy to have the facility within the establishment. Portable/rental steam boilers should be available to support the facility.
- An in-house pharmacy/drug store is a very important component for isolation center as far as the accessibility of supply and intra-hospital distribution is concerned.
- All COVID-19 wastes should be destroyed or transported to any existing processing plant. It could be an on-site incinerator or an autoclave with a shredder being a better option along with proper control of potential air pollutants.
- Hospital drainage, cleaning, and sewage system can be managed with portable ETP/STP to help keep the environment decontaminated.

### 3.2 The Functional Zone in the Isolation Center:

The functional zoning of the isolation center should be based on the risk of infection control. There are three risk areas to be aware of the isolation unit.

- **Triage Zone outside the isolation unit:** Patient triage (or screening) occurs at the entry point of an Isolation Center, which needs to be outside the Isolation Unit. More specifically, it can be either before arrival or upon arrival at the Isolation Center. Triage is the critical point of separating persons suspected of having COVID-19 coronavirus from persons without COVID-19. There a designated waiting and reception area should be design in this Triage zone.

- **Low-risk zone:** The low-risk zone is a medical staff-only area. This includes doctors, medical staff, cleaning staff, water and sanitation, and logistics staff. Staff uses a dedicated disinfection area at the point of entrance/exit between the isolation unit and the low-risk zone. There is a changing area to change from street clothes into scrubs, boots, and a separate area for donning high-risk PPE. There is also a staff laundry facility for washing and drying scrubs, as well as drying other reusable equipment after decontamination, such as boots, goggles, and heavy-duty rubber gloves. The low-risk zone also has areas for storage, a pharmacy, a disinfection solution preparation area, and a staff briefing room, office, or doctor's room.
- **High-risk zone:** In an isolation facility major parts fall under high risk category. The main function of the high-risk zone is to care for patients who either have or are suspected to have coronavirus disease. The high-risk zone is also the area for collecting, processing, and disposing of waste. Patient specimens are collected in the high-risk zone. The laboratory, which undertakes tests other than for biosafety level 2 and Real-Time PCR, is also located in the high-risk zone. Otherwise, the lab might be located off-site and arrangements will need to be made for transporting specimens to the lab. Everything in the high-risk zone—walls, floors, cots, personal belongings, paperwork, patients, and outer layer of PPE—should be considered contaminated.

The high-risk zone itself is divided into two parts: a suspect patient area and a confirmed patient area. Separation of suspected and confirmed cases helps reduce transmission among patients if some of the patients in the suspect area are not true coronavirus cases. Therefore, the flow of patients and staff always moves from the suspect area to the confirmed area, NEVER the reverse.

### 3.3 The Patient/Staff Flow Pattern in the Isolation Center:

#### 3.3.1 Entrances and Exits

- Patients and staff should enter the Isolation unit from the outside using different routes/zones. Patients with suspected COVID-19 coronavirus enter directly into the high-risk zone from the triage area through a one-way entrance. (Figure 1)
- Any caregivers, family, or friends who accompany them not allowed entering the patient treatment area.
- Patient having no syndrome of fever and respiratory illness but having record of travel affected area and contact with affected person, will not admitted in the isolation unit, and leave from the triage area after taking consultation and instruction for quarantine.
- The staff enters the isolation unit through the low-risk zone using a separate, staff-only entrance/exit. Staff members should undergo disinfection on arrival by washing their hands with soap and water, and by spraying their shoes with disinfection solution.
- Discharged patients leave the isolation unit through dedicated one-way exits.
  - Patients without coronavirus exit through the suspect area after taking showers and changing into new clothes.
  - Cured patients exit through the confirmed area after undergoing the same decontamination procedure.

- The staff exits the isolation unit to the outside from the low-risk zone. This is a separate staff-only exit, generally the one through which they entered. As the staff exit, they also undergo disinfection. They perform hand hygiene and their shoes are sprayed with disinfection solutions.

### 3.3.2 Patient and Staff Movement

- Staff and patient movement inside the isolation unit are also important to isolate the high-risk zone from rest of the areas. Movement always flows from lowest risk to highest risk. (Figure 1)
- Staff members should enter the isolation unit from the low-risk zone through a one-way staff only passage, which is a staff-only area. No patients or other people should be in the low-risk zone. Staff members don PPE in the low-risk zone before moving into the high-risk zone.
- There should be a one-way staff-only circulation from the high-risk zone back to the low-risk zone. The medical staffs should doff their PPE before re-entering the low-risk zone.
- Within the high-risk zone, staff movement is also from lower risk to higher risk. Staff always moves from the suspect area to the confirmed area, never the other way.
- Patients also move from lowest acuity to highest acuity, but their movements are confined to the high-risk zone since no patients are allowed in the low-risk zone.
- One patient admitted to the suspect area, patients move to the confirmed area only if they have a positive lab test for coronavirus.

## 4. Isolation Center Design Considerations:

Isolation Center layout can play an important role to reduce the spread of COVID-19 coronavirus. A number of design strategies including proper configuration of space, circulation of patients and medical staffs and airflow design can minimize the spread of pathogens. Besides, spatial layout that ensures the optimal flow of people and material and equipment may help to minimize cross contamination. The design should support the concept of zoning for functional segregation of high-risk zone from low-risk zone to avoid the mixing of patient flow. Ensuring infection prevention and control are central to every stage in designing and will influence how care is provided to patients. The following sections discuss about the design considerations for standard single isolation room and multiple patient isolation room. The number of standard isolation room and multiple patient beds will depend on administrative decision and operational policy of each healthcare authority.

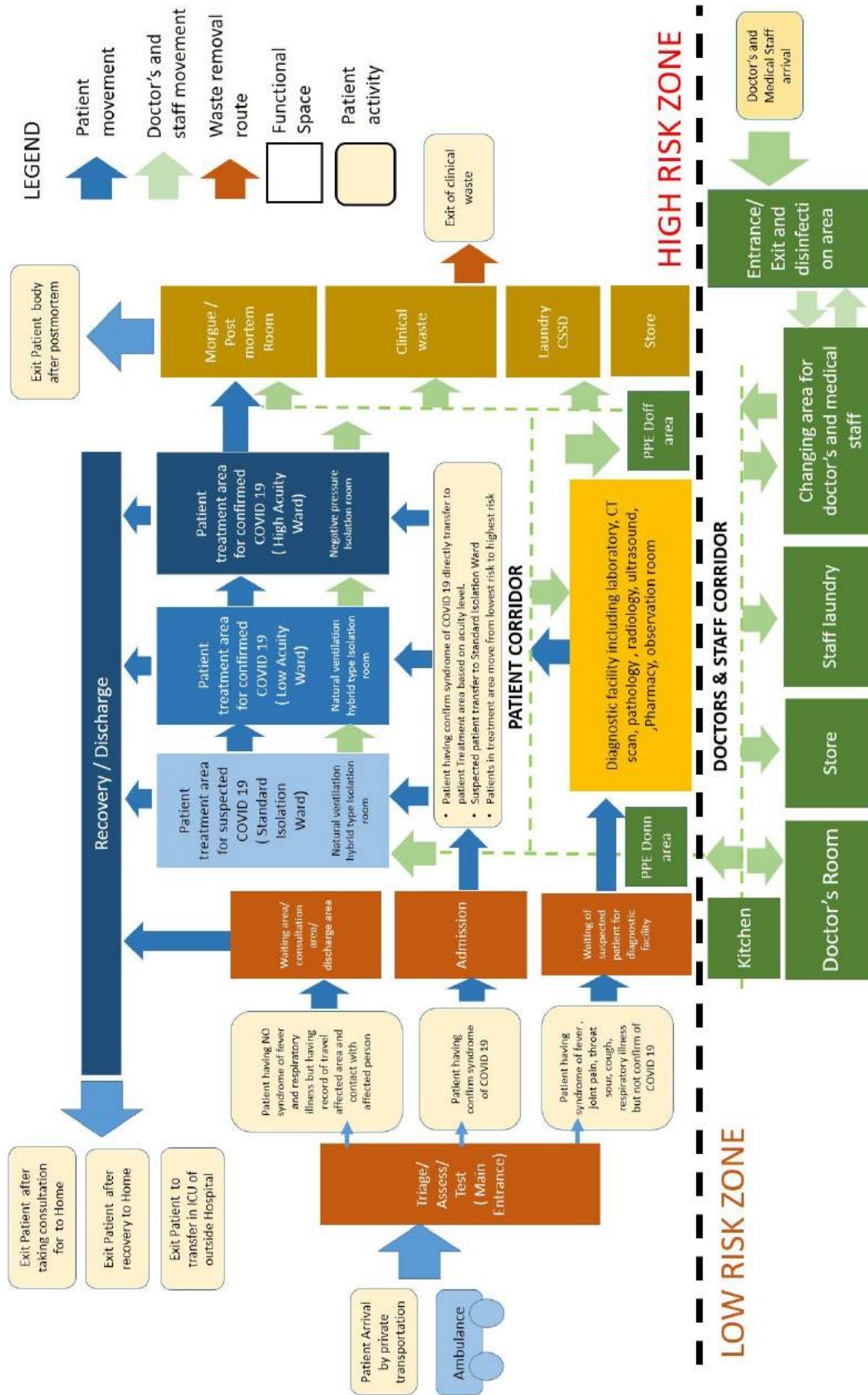


Figure 01: Functional Flow Diagram of the COVID-19 Isolation Center

## 4.1 Design Consideration for Triage Area:

- The availability of signage directing to the triage area needs to be incorporated at the main entrance of the isolation center.
- Reception desk at triage area should have physical barriers (e.g., glass or plastic screens) to limit close contact between triage staff and potentially infectious patients
- The triage area should have sufficient space in the waiting area for ill patients to sit separated from other patients or a process that allows medically stable patients to wait outside the facility.
- Signs need to be posted in triage areas (e.g., at the entrance, and in waiting areas) advising patients with fever or symptoms of respiratory infection to immediately notify triage personnel so appropriate precautions can be put in place.
- Hand washing facilities or Alcohol-based hand sanitizer for hand hygiene should be available at each entrance, in waiting areas, and near treatment stations.
- The Triage area should have dedicated single examination room (one patient per room) with the door closed for examination.
- The waiting area should have tissues and no-touch receptacles for the disposal of tissues in waiting rooms.
- Confirmed or suspected COVID-19 patient should be placed in the appropriate treatment area as soon as possible to from the triage area to minimize the time in waiting areas and during patient transfer, medical staff should maintain  $\geq 1.5$ -metre spatial separation.

## 4.2 Design Consideration for the Standard Single Isolation Room

- An isolation room has to provide uncluttered space around the bed for equipment and the increased number of personnel involved in emergency care.
- All single-patient rooms should have an “en-suite” shower and toilet facilities, and an additional clinical hand-wash sink, with a floor area of 25m<sup>2</sup> within an isolation unit. In a resource constrain condition, minimum floor area can be 19m<sup>2</sup> for single- patient room with en-suite facilities.
- If possible, an anteroom can be designed with a single isolation room to provide a controlled environment and barrier against entry/exit of contaminated air into/out of the isolation room when the door is opened.
- Clinical hand-washbasins with non-touch mixer tap.
- Sufficient and appropriate storage space for waste receptacles inside the room.
- Sufficient and appropriate storage space for PPE outside the room.
- Provision of an observation window with a privacy blind (control by medical staff) to allow staff to observe patients without entering the isolation room.
- Provision of a communication system such as a phone or intercom to allow communication between staff, patients, interpreters, visitors, etc. without leaving the room
- The single isolation room should have appropriate surface finishes (ceiling, walls, floor coverings, etc.) to control infection.
- See annexure.

### 4.3 Design Consideration for Multiple Patient Isolation Room/Ward

- Patients infected with the same microorganism may be placed in the same room providing that they do not otherwise pose a risk to each other.
- A physical distance of 2.4 meters (approx. 8 feet) to be maintained between centers of adjacent beds in a multiple bed isolation room.
- In a resource constrain condition ,a minimum distance of 1.5 meters (approx. 5 feet) is recommended between centers of adjacent beds in a multiple bed isolation room.
- The central corridor should be 2.4 meters to allow for clinical activity and medical equipment.
- A physical barrier between beds can be used for segregation, if possible.
- The beds in suspected patient area will be at least 1 meter apart and separated by a curtain. So that cross-infection may not occur.
- Bed placement should follow alternating in a head-to-toe configuration.
- The nursing station should be located in a way that maximizes visibility into the room.
- Multiple patient isolation rooms should include shower and toilet facilities for the sole use of the male and female patients separately (approx.1 toilet for 20 beds).
- The adequate number of wash hand basins should be provided within the patient care areas and nursing stations to facilitate hand-washing practice (approx. one hand-washbasin for three-beds).
- Adequate and demarcated space should be available in the ward to keep urine samples of patients, their disposal, with contaminated/soiled linen, to make the disinfectant solution and placement of bedpans, etc.
- Separate room for storing dirty utility and soiled linen must be available in all wards. These rooms must have the facility for Hand-washbasin.
- Demarcated space for keeping biomedical waste containers should be available in each ward. Each area should also have space to store housekeeping items.
- The material used in the floor and walls must be easily cleanable and non-porous.
- See annexure.

## 5. Other Special Considerations:

### 5.1 Ventilation

- Ventilation is an important means to control the cross-infection by removing or diluting virus aerosols exhaled by infected patients. Through designing an appropriate ventilation system in the isolation center, it is possible to supply outdoor air and remove extra heat, humidity, and contaminants from occupied spaces. Besides through designing an appropriate ventilation system, it is possible to remove the droplets nuclei efficiently, which potentially contain pathogens, which may help to minimize the cross-infection risk.
- According to WHO, COVID-19 coronavirus is not an airborne virus, it can only spread through droplet and contact transmission, and research shows that for infection control droplet and contact transmission do not need special air conditioning system in patient room. Based on the fact, we recommend natural ventilation for the suspected patient treatment room, and low

acuity confirmed patient treatment room and mechanical ventilation system (negative pressure room) only for high acuity confirmed patient treatment.

- For natural ventilation, the patient treatment area should have large windows on opposite walls of the room allowing a natural unidirectional flow and air changes. For efficient natural ventilation, it is important to allow and enhance the flow of outdoor air by natural forces such as wind and thermal buoyancy forces from one opening to another to achieve the desired air change per hour.
- A hybrid natural ventilation system can be used to get a desirable air change per hour with a patient room. In such a case, by putting up exhaust fans can create desirable air exchange rate through driving the air out of the room. The size and number of exhaust fans will mainly depend on the targeted ventilation rate and must be measured and tested before use.
- The location of air inlets and exhaust outlets influences the movement of air within the room. High wall or ceiling inlets and low wall outlets allow clean air to move downward through the area toward the contaminated floor where it can be removed through the lower out (exhaust). This system may be useful for the suspected and low-risk patient's treatment area, and to reduce spread infection by large droplets, which rarely move more than a few feet from the source patient.
- Negative pressure in isolation rooms is essential for high acuity confirmed patient care who requiring aerosolization procedures (intubation, suction nebulization). The negative pressure room may have a stand-alone air-conditioning system with 12-15 air changes/hour and filtering of exhaust air through minimum H13 grade HEPA filter.  
For effective air pressurization, it is important to ensure the room is as airtight as possible, with monolithic ceilings, well-sealed penetrations, tight-fitting doors and windows, and a door grille designed for a controlled air path.

## 5.2 Surface Material:

Planning and choice of materials also play a role in infection control. It is also important for designers to consider how surfaces are treated within an Isolation Center.

- Both choosing appropriate interior materials and reducing the amount of surfaces that patients and medical staffs might come into contact with, can help to mitigate the transfer of pathogens throughout the isolation center.
- Research shows that the seamless materials that do not have any cracks—that can easily washed down and do not react easily to disinfectants are useful to reduce the contact transmission of virus. Continuous impervious surfaces such as welded vinyl, epoxy coatings, or similar durable surfaces are useful, which is also easy to clean.
- Besides, research suggests reducing the design of horizontal surface may helpful to control infection in patient treatment area. The best way to keep bacteria and viruses from spreading is to limit the high touch surface such as cubicle, curtains, blinds, monitor screens, and door handles and provides alternative design solution by using technology so that there is not a place for these microbes to land.

## 6. Conclusion:

In summary, it can be noted that evidence shows an association between the architectural design of healthcare facility and infection control. To minimize the spread of the COVID-19 coronavirus,

Isolation center design may help to prevent the spread of infection within the healthcare facilities. All levels of control in an isolation system (administrative controls, environmental and engineering controls, and personal protection) are important and should be taken into account when designing an isolation center. This document tries to provide a basic understanding of the infection control hierarchy and strategies for the healthcare architects of Bangladesh so that they can consider the infection control criteria in the design phase. We expect that the guideline will not only help to design a healthy and safe environment but also help to plan rational design solutions that minimize the complexity, operational and maintenance costs.

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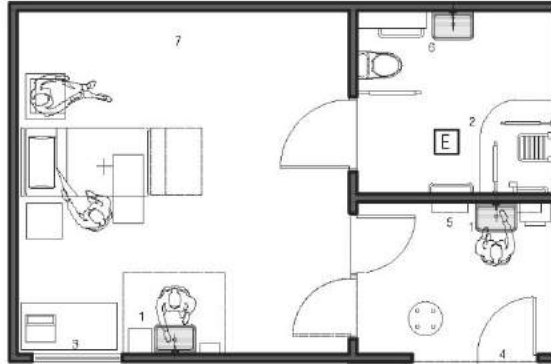
## Annexure



**Figure 02: Standard Single room layout with En-suite facilities** (Adopted from NHS Scotland, 2008)

Minimum requirements:

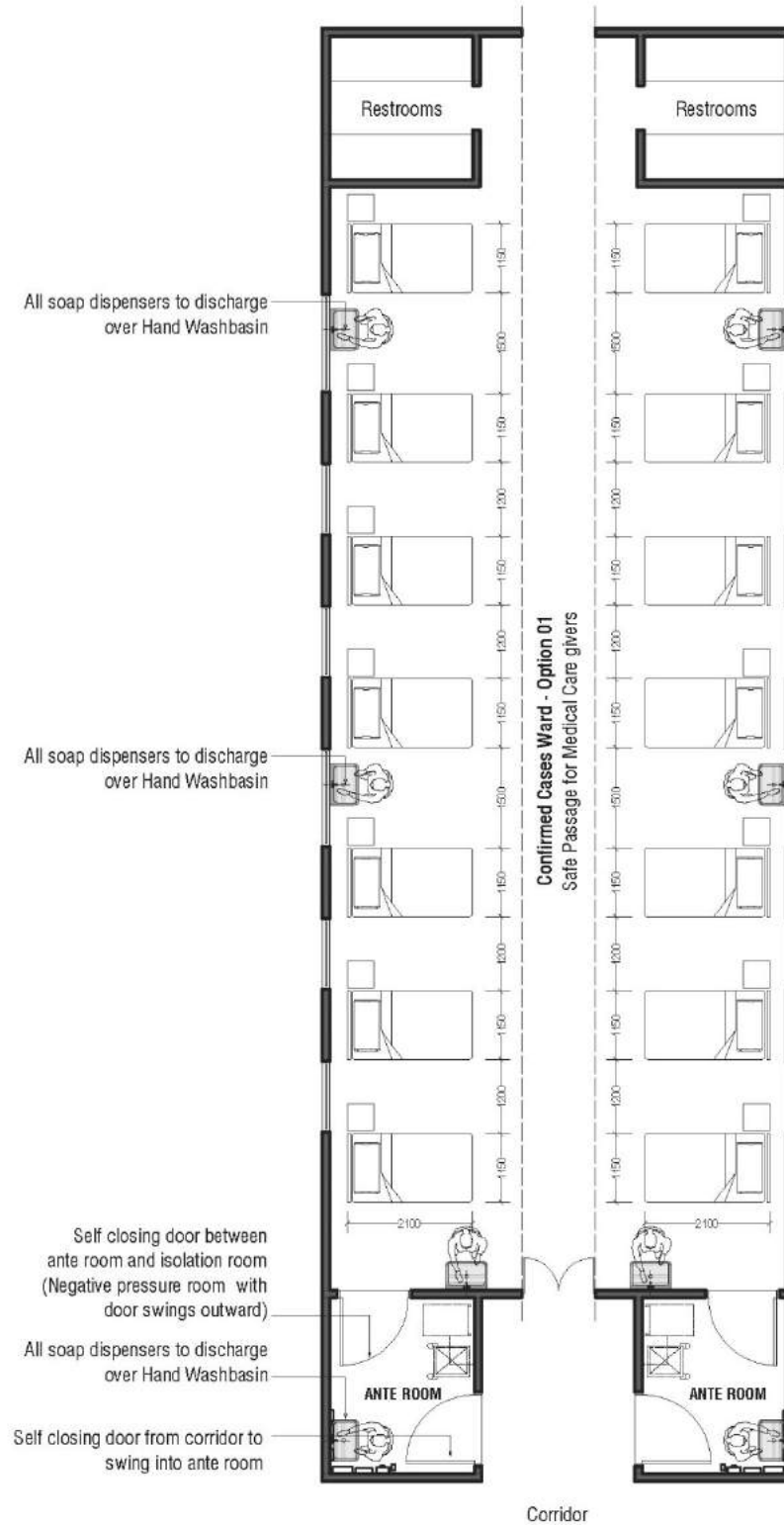
1. Clinical hand-wash basin with non-touch, fixed temperature mixer tap.
2. Provide suitable extract fan.
3. Observation window in corridor wall with integral privacy blinds to allow for staff observation and patient views out.
4. En-suite WC to be non-touch flush and hand-wash basin to have single tap with flow and temperature control.



**Figure 03: Standard Single room layout with En-suite facilities and with Ante room** (Adopted from NHS Scotland, 2008)

Minimum requirements:

1. Clinical hand-wash-basin with non-touch, fixed temperature mixer tap.
2. Provide suitable extract fan.
3. Observation window in corridor wall with integral privacy blinds to allow for staff observation and patient views out.
4. Double door for personnel and bed access.
5. Disposable apron dispenser.
6. En-suite WC to be non-touch flush and hand-wash basin to have single tap with flow and temperature control.
7. Ceiling to be sealed solid construction, external window to be sealed.



**Figure 04: Standard Multi-bed Patient room layout with En-suite facilities and with Ante room (for confirmed COVID-19 patient treat room)**  
(Adopted from NHS Scotland, 2008)

