

## Commentary



# Triage guidelines for emergency department patients with COVID-19

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### Abstract

The recent emergence of coronavirus disease-2019 (COVID-19), demonstrates the pandemic potential of COVID-19, the rapid spread of this virus across the world in only a few months highlights the transmissibility of this disease and the significant morbidity and mortality that it can cause, And these reasons make the importance of triage even more colorful at this point. Thus, we designed the principles for better emergency department triage of these patients and reducing the possible risks of transmitting this disease. We hope that with this study, we will be able to partially solve the triage problems of these patients and the problems of the healthcare staff.

### Introduction

This guideline is based on currently limited information on coronavirus disease 2019 (COVID-19) regarding the severity, rate of transmission, and course of the disease. In December 2019, many cases of pneumonia of unknown source were identified in Wuhan, China.<sup>1</sup> This Disease was identified to be caused by a new type of coronavirus, named COVID-19 by the World Health Organization (WHO).<sup>2</sup> The disease spread rapidly, resulting in an epidemic in China. Followed by numerous cases in other countries around the world, the WHO officially declared a pandemic on March 11, 2020.<sup>2</sup> One of the most important things at the time of a pandemic is to identify and manage patients at the forefront of the healthcare system.<sup>3</sup>

This guideline is designed to help frontline healthcare staff (EDs) to identify and manage urgently COVID-19 patients. Rapid diagnosis and effective triage and separation of patients are necessary, to prevent the spread of the virus among patients and healthcare personnel in health centers.<sup>4</sup>

### Safety Control

Given the quick spread of the disease COVID-19, it is advisable to control the waiting room and isolation room

of people suspected of COVID-19 from those with a definite diagnosis of COVID-19 to stop the spread of the virus as far as possible.<sup>5</sup>

It is necessary to separate the COVID-19 patients' rooms and other rooms into three distinct areas according to Table 1.

In the areas mentioned above, all objects, surfaces, doors, and windows are considered infected, semi-infected or clean depending on their classifications.

Due to the presence of the virus on the surfaces and in the air, increasing ventilator port filters, ongoing use of air disinfectant to disinfect the air, repeated disinfection of ground and object surfaces, changing gloves and hand washing after each procedure, covering the keyboard and mouse of the computer and changing their coverage every day are effective in preventing the spread of the virus.

### Emergency admission<sup>6,7</sup>

- Separate entrance for patients with respiratory problems.
- It is essential to maintain a communication distance of 1 to 2 meters to reduce contact with staff.
- Prevent the traffic of common referrals to the ED and identify patients at risk of COVID-19 before or

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**Table 1.** Danger level in emergency department areas with COVID-19 patient.

Danger level	Classification	Examples
1. High-risk area	Infected area	1) Isolation rooms 2) Consulting rooms 3) Examination room 4) Laboratory 5) Blood collection room
2. Medium-risk Area	Semi-infected area	6) Buffer room 7) Triage units
3. Low-risk area	Clean area	8) Workroom

immediately during healthcare entry and guide them to a safe area.

- Provide surgical masks and gloves at the entrance of the ED to prevent patients and staff from infection, Provide patient education and follow-up as much as possible by telephone or video call.
- When the patient arrives at the hospital before being admitted to the triage unit, be questioned by (the receptionist or someone else) about the attending reason (fever, sore throat, cough, and shortness of breath).
- If the patient has a cough, sore throat, shortness of breath, chills with or without fever, refer the patient to the infectious triage unit.
- There is a specific process at the emergency room to separate suspicious cases from other patients (e.g., sitting in different waiting rooms, using different toilets, access to different food buffets).
- Make sure everyone with similar symptoms of COVID-19 or other respiratory infections (such as cough and fever) is familiar with respiratory health, coughing habits, and hand hygiene.
- Install visual warning notices (such as signs and posters in the appropriate language) about hand hygiene, respiratory health, and coughing habits to familiarize patients and healthcare personnel with health guidelines at busy entrances and areas (such as waiting rooms, elevators and cafeterias).
- Clients can wait in their cars instead of waiting rooms and contact the medical staff if necessary.

(Install Figure 1 at the emergency entrance and reception unit and the route to the triage)<sup>7-8</sup>

#### Telephone triage<sup>9</sup>

- If there is a telephone triage system, use it before visiting the hospital and enter the ED triage system after final approval.
- Use of Telemedicine to guide patients to the most well-equipped hospitals managing the COVID-19 can help prevent coronavirus transmission.
- Perform appropriate risk screening COVID-19 when calling and dispatching the emergency medical services (EMS) team.
- Give the community enough information on how to use the telephone triage process (if available) and the

fact that visiting hospital ED triage should be done after telephone triage and confirmation.

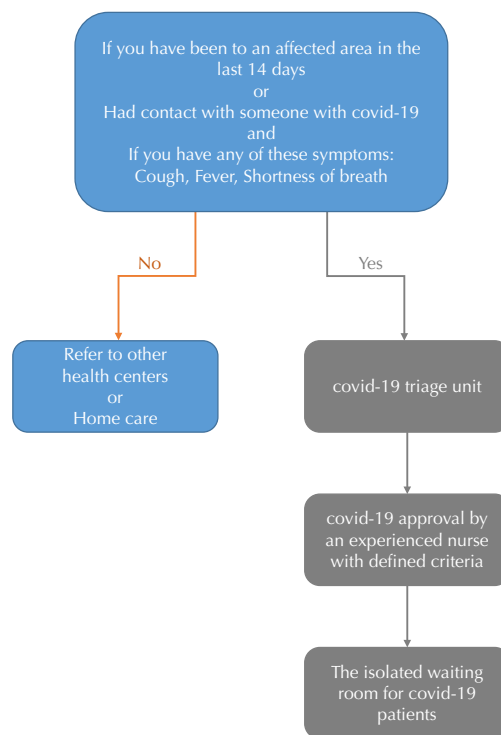
- Consider setting up communication systems to allow clients to communicate via telephone or other systems rather than direct contact with medical staff.

#### ED Traffic Restrictions<sup>7-10</sup>

- Restrict unnecessary personnel crossings to the ED and triage unit.
- Depending on the patients' needs, if it is required for a person to accompany the patient, a maximum of one person should be permitted. The accompany should be equipped with personal protective equipment (PPE) and should follow the instructions for the personal protection of the COVID-19.
- Equipment used to clean contaminated areas should be separated from clean areas, and the staff should restrict the crossing of contaminated areas to a clean area.
- The gap between people in the waiting room is at least 1 to 2 meters, and they should easily access to respiratory health requirements.
- In some systems, patients with a stable clinical condition could wait in a personal vehicle or outside the healthcare system until notified by a telephone call and then arrive at the assessment site.
- Restrict visitors from entering the known or suspected COVID-19 patient room.
- Alternative mechanisms for patient-to-visitor interaction, such as mobile or tablet video calls, should be considered.
- Centers can consider exceptions based on end-of-life conditions or when a patient is in need of emotional care.
- Health centers should guide hand hygiene before visitors enter the patients' room. Also, limiting the touch of surfaces and the use of PPE following the facilities available in the patient room are necessary.
- Visitors should be instructed to restrict their movement inside the health center.
- Visitors who are exposed to COVID-19 are advised to report to the physician any signs and symptoms of acute illness for at least 14 days after the last known contact with the patient.
- All visitors should follow respiratory health and coughing precautions in all areas of the health center.

#### Triage unit<sup>7-10</sup>

- The triage unit should be arranged in a way to prevent the crowd, so the patients can enter on one side and leave the triage unit on the other side.
- To avoid congestion in the triage unit, make sure that the waiting room is organized and placed in a safe environment.
- Use experienced personnel for initial triage and even telephone triage.



**Figure 1:** Flowchart of patient triage in COVID-19 Referral Hospitals

- Training and providing protective equipment to clients can help to reduce COVID-19 transmission.
- Facilities for transportation (wheelchair, stretcher) should be covered with disposable items.
- Ventilate the triage unit according to standards.
- Triage unit should be disinfected at least three times a day. If needed, disinfecting all the surfaces and the rooms should be considered.
- Dedicated waiting rooms and the examination room and isolation room of these patients should be managed in such a way to prevent the unnecessary movements. (Install Figure 2 at the triage station and waiting room for patient examination)<sup>8</sup>

### The triage process<sup>11</sup>

Three key issues need to be considered to perform rapid and safe infectious disease triage:

1. Observe standard precautions (respiratory and hand hygiene, prevention of contact with sharp objects, safe waste management, safe and clean unit, use of PPE)
2. Patient clinical risk assessment (airway, breathing, and circulation)
3. Obtain a history of the symptoms of COVID-19 disease (cough, sore throat, shortness of breath, respiratory rate and oxygen saturation)

The triage nurse should have a syndromic approach to patient risk assessment and refer the suspected cases to the waiting room, examination room or isolated room.<sup>12</sup>

The following steps are essential to make referrals faster and stop further spread of the disease.

- Top priority patients are sent non-stop to the gray area in the isolated area.
- If the patient is brought to the hospital via ambulance, EMS personnel must inform the hospital's ED to prepare the treatment center for the infected patient; In this regard, a protocol should be designed between the hospital ED and the EMS system.
- Enable the electronic file system in the triage and hospital admissions and register the patients' electronic file without exchanging any paper (medical records, insurance records, medical records)
- The nurse who cares for the COVID-19 Patient exempts other patient care to prevent transmission of infection.
- Ask all patients about clinical symptoms, respiratory problems, travel history to contaminated areas, or possible contact with COVID-19 patients.
- Perform triage and isolation promptly for patients with suspected symptoms of COVID-19 or other respiratory infections (such as fever, cough...) (Figure 3).

### Patient location<sup>7-12</sup>

- Place the patient confirmed or suspected with COVID-19 in an isolated respiratory infection chamber made under current guidelines.

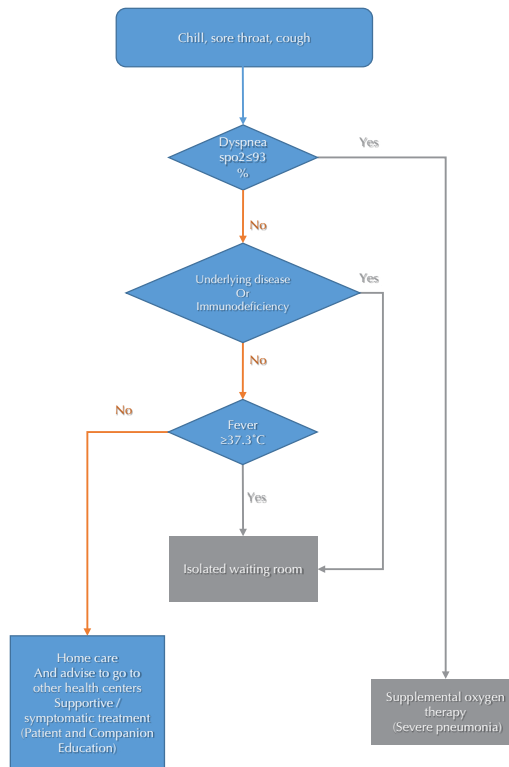


Figure 2: Diagnostic criteria for triage nurses in COVID-19 patients.

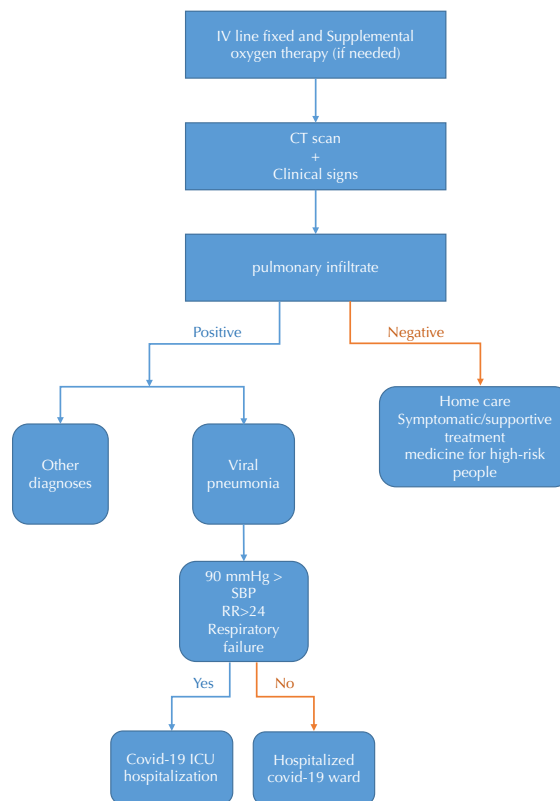


Figure 3: Diagnostic criteria in an isolated waiting room

- Isolated single board room with negative pressure relative to the surrounding area with at least six air changes per hour is recommended.
- The air in these rooms must be ventilated directly or clean up with a HEPA filter (high-efficiency particulate air).
- Room doors should be kept closed except at the entrance and exit, and minimize entry and exit. The correct negative pressure function of these rooms must be recorded and monitored.
- If an isolated room is not available, patients who need hospitalization should be transferred to the most appropriate location as soon as possible.
- If the patient does not need hospitalization, they can be discharged (according to the available ministry guidelines).
- If patient transfer or discharge is delayed, give the patient a mask and Isolate the patient in a room with closed doors. Ideally, the patient should not be placed in a room with no HEPA filters, or outlet air flows back into the building.
- Restrict patient transportation from an isolated room except for essential medical purposes. Outside the room (such as when moving and when this type of rooms are unavailable), the patient must wear a mask to prevent the spread of infection.
- If there is an increase in the number of patients, try to have patients with pneumonia, fever and cough symptoms in one space and patients with lighter symptoms in another.

**Transfer patient from triage unit<sup>7</sup>**

- The route of transfer patients suspected to COVID-19 from the triage unit to the isolated room is preferably gray.
- Find the best ways to move patients in the hospital and inform all employees.
- All staff involved in the patient transfer process receive adequate training on how to use PPE and observe safety during the transfer.

**Personal protective equipment<sup>7-12</sup>**

- In standard precautions, it is assumed that any person

is potentially infected or colonized with a pathogen that is transmissible in the healthcare system.

- Respiratory hygiene requirements, 60%-95% alcohol-based hand rubs, disposable paper towels, trash with lid and pedal, and facial masks are available at the ED entrance, waiting room, triage room, and patient room.
- The surgical masks should be available for symptomatic patients.
- Disposable gloves should be provided for the patient and companion if needed.
- Surgical mask, face shields, glasses, gloves and gowns should be provided for healthcare workers.
- N95 mask should only be used when healthcare personnel have to take a procedure that could lead to aerosol production.
- The trash with lid and labeled infectious waste for sanitary disposal should be considered.

**How to use personal protective equipment<sup>12</sup>**

In the triage unit, the proper protective equipment required is usually surgical masks, face shields, gloves, and hand rubs, but depending on the type of triage unit procedures and conditions, the following tables should be used for PPE (Tables 2-6).

For procedures that lead to aerosol production, consider separate rooms with negative pressure ventilation (12 times per hour), and use Respirator N95 or FFP2 standard or equivalent, gown, gloves, eye protection and apron.<sup>12</sup>

**Triage staff<sup>3</sup>**

- Infectious triage personnel should be experienced emergency nurses capable of managing critical situations. Also, depending on the needs of the experienced nurse/physician/supervisor, the triage unit should be supported in times of congestion so that patients should be in the pre-hospital space. Patients should be quickly organized and assigned to the pre-triage area, triage unit, and waiting area for examination.
- Triage personnel should try to minimize the risk of transmission of infection between other healthcare professionals and patients in triage.

**Table 2.** How to use PPE in the screening area

	Personnel or cleaners	Activity	Type of PPE
1.	Personnel	First screening (temperature measurement) not involving direct contact	Maintain a spatial distance of at least 1 meter. (No PPE required)
2.	Personnel	Second screening (i.e. interviewing passengers with fever for clinical symptoms suggestive of COVID-19 disease and travel history)	Surgical mask Gloves hand rub
3.	Cleaners	Cleaning the area where passengers with fever are being screened	Surgical mask Gown Heavy-duty gloves Eye protection Boots or closed work shoes

**Table 3.** How to use PPE in the triage unit

	Personnel or patients	Activity	Type of PPE
1.	Healthcare workers	Preliminary screening (not involving direct contact)	Maintain a spatial distance of at least 1 meter. (No PPE required)
2.	Healthcare workers	Providing direct care to COVID-19 patients	Surgical mask Gown Gloves Eye protection (or face shield) hand rub
3.	Patients with respiratory symptoms	Any	Maintain a spatial distance of at least 1 meter. Provide medical (mask if tolerated by patient)
4.	Patients without respiratory symptoms	Any	No PPE required

**Table 4.** How to use PPE in the waiting room

	Patients	Activity	Type of PPE
1.	Patients with respiratory symptoms	Any	Provide medical mask. (Immediately move the patient to an isolation room; if this is not possible, ensure the spatial distance of at least 1 meter from other patients)
2.	Patients without respiratory symptoms	Any	No PPE required

Based on the findings of studies, the healthcare staff should observe the following for their safety and protection, and the healthcare system must provide the necessary resources.<sup>13</sup>

- Cloakroom, personnel restroom, dining area, and other unnecessary rooms should not be inside the COVID-19 ward.
- At the end of each shift, staff protective dress should be washed and sterilized if they are washable. Otherwise, they should be discarded by infection control standards.
- All staff will monitor their body temperature before commencing shifts. If the body temperature is elevated, or they are experiencing any symptoms of upper respiratory tract infection, myalgia, and diarrhea, they have to quarantine themselves.
- Personnel should dine out of the isolated wards with strict precautions to prevent COVID-19 transmission. Also, their diet should contain fruits, green vegetables, and vitamin D3.

**Patient safety**<sup>7-12</sup>

Rapid identification and effective triage and isolation of potentially infectious patients (suspected of infection) are essential to prevent unnecessary exposure among patients, healthcare personnel, and their companions. The following points should be considered to ensure patient safety from triage:

1. Equipment used for the patients (including sphygmomanometer, stethoscope...) must be disinfected with alcohol after use for each patient.
2. Try not to overcrowd the patients in the corridors and rooms unless clinically necessary. Portable devices may be used as much as possible.
3. Write down the names of people who are next to the

patient or those who enter the COVID-19 patient's room to avoid overcrowding.

**Standardization of triage intensity**<sup>14</sup>

Purpose of triage in the ED is to prioritize the referred patients and identify the patients who have a life-threatening condition and are unable to wait long. So, the triage nurse, with a brief and careful assessment of the patient, (Figure 4) assigns a level of triage to the patient and guides the patient to specific locations. (Table 7) The goals of triage are:

1. Quick Evaluation of admitted patients and waiting for patients to reduce their potential risks.
2. Determining the patients' emergency needs and proper care with dedicated triage code.
3. Patients' guidance to the designated location to providing appropriate care.

Therefore, the primary goal of triage nurse is to quickly evaluate patients according to their clinical needs. This evaluation includes collecting information (about the patients' medical history, major problems, subjective and objective data and...).<sup>14</sup> The nurse should make the right decision after a brief evaluation. One of these decisions is to assign a triage code to the patient based on patient status and triage guidelines. Based on the triage scale currently used in EDs, patients are classified into five levels based on the emergency severity index. Patients with COVID-19 admitted to referral hospitals need to be leveled and placed in defined locations. COVID-19 patients should be accommodated in separate locations according to their current status (probability and certainty of diagnosis).

**Clinical signs and symptoms checklist**<sup>15,16</sup>

This checklist highlights (1) Clinical signs and symptoms,

**Table 5.** How to use PPE in the temporary isolation area

	Personnel or cleaners	Activity	Type of PPE
1.	personnel	Entering the isolation area, but not providing direct assistance	Surgical mask Gloves hand rub Maintain a spatial distance of at least 1 meter.
2.	personnel	Assisting the patient being transported to a healthcare facility	Surgical mask Gown Gloves Eye protection
3.	Cleaners	Cleaning isolation area	Surgical mask Gown Heavy-duty gloves Eye protection Boots or closed work shoes

**Table 6.** How to use PPE in other areas of patient transit

Personnel	Activity	Type of PPE
1. All staff	Any activity that does not involve contact with COVID-19 patients (e.g. Walk in sections and corridors)	No PPE required

(2) Other signs and symptoms, (3) High-risk patient records, and (4) Exposure to people with COVID-19 symptoms for the past 14 days (See Supplementary file 1 for more details).

**High risk patients<sup>17</sup>**

- Older adults with 60 years of age or more
- People with underlying diseases, for example, heart disease, lung disease, diabetes or hypertension
- People with weak immune systems

**Pregnancy and COVID-19<sup>18</sup>**

We are still learning about COVID-19. We do not yet know how it acts on pregnant women, but other pulmonary viruses can cause serious illness in pregnant women.

- One of the common symptoms of COVID-19 is fever. Fever can increase the risk of problems during the first trimester (week 0 to 13).
- They should also avoid people who do not look healthy.
- It is unclear whether the COVID-19 can be transmitted through breast milk, but droplet contact can occur during breastfeeding.
- If the mother is suspected of being infected with COVID-19 or a mother who has been confirmed to have COVID-19, precautions, such as hand hygiene and mask use, should be taken during breastfeeding.
- If the mother is too unwell to breastfeed baby due to COVID-19, another option is to express the milk regularly so that the baby keeps receiving the mother's breast milk and so is less likely to become unwell. Before expressing the milk, wash hands thoroughly with soap and water.

**People with a weak immune system (Immunosuppressed)<sup>17</sup>**

Other lung viruses can cause severe illness in patients with weak immune systems. This may be the same for COVID-19, and it is why you should take further care if you have a weak immune system.

A weak immune system can have many causes:

- Patients with autoimmune disorders such as rheumatoid arthritis, lupus, multiple sclerosis (MS), inflammatory bowel disease (Crohn's disease) and (ulcerative colitis), who are under treatment
- HIV positive patients
- Patients with an organ transplant or bone marrow transplant
- Patients undergoing chemotherapy
- Cancer patients

**Table 7.** Covid-19 Patient Scoreboard

	Clinical signs and symptoms	Points
1.	Direct contact with a positive COVID-19 patient	3
2.	Recent travel (Through the past 14 days)	2
3.	Fever ( $\geq 37.3^{\circ}\text{C}$ )	2
4.	Dry cough	2
5.	Anorexia	1
6.	Fatigue	1
7.	Myalgia	1
8.	Dyspnea	1
9.	Headache, sore throat, rhinorrhea, gastrointestinal symptoms (e.g., nausea and diarrhea)	1
High-risk people		
10.	Age over 60 years	2
11.	Diabetes	2
12.	Hypertension	2
13.	Chronic Kidney disease	2
14.	Chronic liver disease	2
15.	Heart disease	2
16.	pulmonary diseases	2
17.	Patients treated with immunosuppressive drugs	2
18.	Patients with immunodeficiency	2
19.	Obese patients with a BMI > 40	2

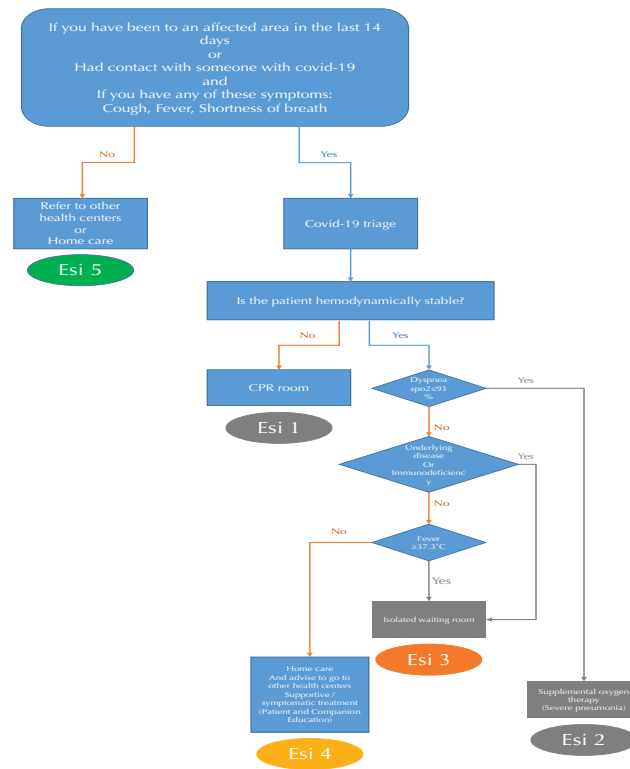


Figure 4: ESI Triage Algorithm in COVID-19 patients.

**Guidance home care of people not requiring hospitalization for COVID-19<sup>8-19</sup>**

These patients should stay at home and try to isolate themselves from other people and pets; they should also wear masks in the room (or vehicle) or when visiting health centers.

In cases where care must be taken at home, a trained healthcare worker should evaluate whether the residential setting is appropriate for providing care. It is recommended to assess whether the patient and family can observe precautions as part of home quarantine (e.g., hand hygiene, respiratory hygiene, cleaning the environment, patient mobility restrictions outside or indoors) and can address safety concerns (e.g., accidental ingestion of and fire risks related to using alcohol-based hand rubs).

There should be a way of communicating with the healthcare provider or public health personnel or both during the time at home (until the symptoms are completely resolved).

Patient and family members should be educated about personal hygiene, simple infection control measures, and how to care for a family member suspected of COVID-19 to prevent the spread of the disease to family members as far as possible.

The patient and family should be provided with ongoing support and education, and patient monitoring should be continued for the duration of home care. Patients and families should follow these recommendations:

- Place the patient in a well-ventilated room (i.e., with open doors and windows).
- Limit patient movement at home and ventilate (e.g., keep windows open) shared areas (e.g., kitchen, bathroom).
- Family members should stay in another room, if that is not possible, maintain a distance of at least 1 meter from the patient (for example, sleeping in a separate bed).
- Limit the number of caregivers. Ideally, assign someone who is in good health and has no underlying disease or immune deficiency. Visitors should not be allowed to visit until the patient is fully recovered and has no symptoms.
- Do hand hygiene immediately after any contact with patients or their surroundings. Hand hygiene should also be done before and after meals, before eating, after using the toilet and whenever the hands look dirty.
- When washing the hands with soap and water, it is best to use disposable paper towels to dry hands. If these are not available, clean towels should be used, and replaced when wet.
- To prevent respiratory secretions, a surgical mask should be provided to the patient and used as far as possible. People who cannot tolerate a surgical mask should use rigorous respiratory hygiene (i.e., cover their mouth and nose with a disposable paper towel



when sneezing or coughing). Materials used for covering the mouth and nose should be discarded or cleaned properly after use (e.g., you can wash the handkerchiefs using soap or detergent and water).

- Caregivers should have a medical mask on their mouth and nose when they are in the patient room. The mask should not be touched when using. If the mask gets wet or dirty, it should be replaced immediately with a new, clean mask. Dispose of the mask immediately after use and do hand hygiene.
- Avoid direct contact with body fluids, especially oral or respiratory secretions and stool. Wear disposable gloves and mask during oral or respiratory care and when handling patient stool, urine, and other waste. Do Hand hygiene before and after removing gloves and masks.
- Do not reuse a mask or glove.
- Use special linen and dishes for the patient. These should be cleaned with soap and water after use and reused, instead of discarded.
- Clean and disinfect daily surfaces that are frequently touched in the patient's room, such as bedside tables, bed frames, and other bedroom accessories. Common household soap or detergent should first be used for cleaning, and after washing regular household disinfectant containing 0.5% sodium hypochlorite (i.e., 5000 ppm chlorine or 1 part bleach to 9 parts water) should be used.
- Clean and disinfect bath and toilet surfaces at least once a day. Household soap or detergent should first be used for cleaning, and after washing should be used with a regular household disinfectant containing 0.5% sodium hypochlorite.
- Clean patient clothes, bed linen, and hand towels and bath and hand towels using ordinary soap and water or washing machine at 60-90 °C with a common household detergent and dry thoroughly. Put contaminated linen in a bag. Do not shake dirty linen bags and avoid contaminated materials coming into contact with skin and clothing.
- Protective clothing and gloves (for example, plastic aprons) should be used when cleaning surfaces or clothing or handling clothing or linen soiled with body fluids. Depending on the type of work, utility or disposable gloves can be used. After use, utility gloves should be cleaned with soap and water and disinfected with 0.5% sodium hypochlorite solution. Disposable gloves (e.g., nitrile or latex) should be disposed of after each use. Perform hand hygiene before and after removing gloves.
- Gloves, masks and other waste generated during patient care must be placed in a trash bin with a lid in the patient's room before being disposed of as infectious waste.
- Avoid exposure to other contaminants from the patient's environment (such as toothbrushes,

cigarettes, utensils, dishes, drinks, towels, washcloths or bed linen).

- When healthcare workers provide home care, they should evaluate the risks involved in selecting the appropriate PPE and follow the recommendations for droplets and contact precautions.

#### **Conflicts of interest**

The authors have no conflicts of interest to declare.

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#### **Online Supplementary Materials**

Supplementary file 1 contains clinical signs and symptoms checklist.

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