



INTERNATIONAL
SOCIETY
FOR INFECTIOUS
DISEASES

GUIDE TO INFECTION CONTROL IN THE HOSPITAL

THE 2019 CORONAVIRUS DISEASE (COVID-19) AND ITS CAUSATIVE AGENT, SARS-CoV-2

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KEY ISSUE

COVID-19 is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). SARS-CoV-2 emerged in Wuhan city, Hubei, China in December 2019. The initial event was related to a cluster of pneumonia cases associated with a “wet” market. The outbreak was reported officially to the World Health Organization (WHO) at the end of December 2019 following isolation of this virus from the affected patients. Soon, the genomic sequence of the virus was made available to scientists around the world. SARS-CoV-2 was classified as belonging to lineage B of the genus *Betacoronavirus* and was closely related to the known SARS-CoV which was responsible for the SARS outbreak in Hong Kong and beyond in 2003.

KNOWN FACTS

- COVID-19 emerged in Wuhan city, Hubei Province, China in December 2019.
- Severe pneumonia was reported in about 17.7% of all cases.
- The etiology of COVID-19 is SARS-CoV-2, a *Betacoronavirus* closely related to the known SARS-CoV.
- The intermediate host has not been identified yet.
- The incubation period for COVID-19 is thought to be 2-14 days (median of 5 days).
- Recognition of the COVID-19 epidemic was important and the credit goes to Chinese scientists including the late Ophthalmologist Li Wenliang, one of the eight physicians who alerted the world of an outbreak of pneumonia of unknown etiology. In addition, the web-based international surveillance system for emerging pathogens — ProMED — had reports of cases of undiagnosed pneumonia resembling SARS

weeks before the World Health Organization (WHO) reported the epidemic.

- There is no clear data on the rate of infected healthcare workers from Wuhan, China, however, it is estimated that more than 1,700 health workers were infected by SARS-CoV-2 and there were 6 deaths.

Controversial Issues

- The main route of transmission of SARS-CoV-2 is direct person-to-person transmission.
- It is thought that the virus spreads primarily via large droplets and thus, close contact is a risk factor.
- Droplet nuclei transmission (airborne) may occur during aerosol generating procedures (AGP), particularly when there is poor ventilation.
- Fecal transmission for SARS-CoV-2 has been suggested recently, similar to SARS but this is yet unproven.
- Environmental contamination may play a role in transmission via contact.
- Currently, there is no approved therapy for COVID-19.
- Routine cleaning and disinfection of surfaces are adequate in healthcare settings.

SUGGESTED PRACTICE

General Principles

It is important to realize and adhere to the routine practice of early identification, triage of suspected patients, and prompt isolation together with contact tracing. In some countries universal masking for the community and healthcare workers is compulsory. Port Health at country entry ports who are taking the temperature of arrivals may only need hand hygiene (alcohol-based hand rub/ABHR) if more than 1 m (3 ft) away,

behind a desk or partition, and a surgical mask if part of universal masking. In healthcare facilities where there is no aerosol generating procedure (AGP) involved, eye protection, face mask, gloves, and aprons are recommended. Respirators are recommended in situations where an AGP (such as suctioning, intubation, or nebulization therapy) is undertaken. It is not clear whether taking a nasopharyngeal swab will require a respirator, but it is generally recommended due to the close proximity with the person from whom the sample is taken. The World Health Organization (WHO) states that health workers who collect nasopharyngeal and oropharyngeal swabs use appropriate PPE (personal protective equipment, i.e., eye protection, medical mask, long-sleeved gown, and gloves). If the specimen is collected with an AGP (e.g., sputum induction), the person conducting the procedure should wear a particulate respirator at least as protective as a NIOSH certified N95, an EU standard FFP2, or equivalent.

It is important to keep in mind that the use of gloves does not substitute hand hygiene. Gowns and eye protection should be used, especially with aerosol generating procedures. It is preferable to place the patient in a room with negative pressure ventilation (NPV) or if not possible, a room with increased ventilation, especially during aerosol generating procedures (Table 1).

Table 1: Management of Suspected COVID-19 Patients

- Isolate the patient
- If possible place the patient in a private room with good ventilation (negative-pressure ventilation/NPV is desirable).
- Wear the apron, then the mask and goggles, and lastly the gloves, and if an aerosol generating procedure, use a respirator.
- Just before leaving the room, remove the gloves first, then the apron, the goggles, and finally the face mask, deliberately and carefully to avoid contamination.
- Carry out hand hygiene (ABHR or washing).
- If respirator was used, carefully remove the respirator (N-95 or PAPR) outside the patient's room without contaminating hands.

- Perform hand hygiene after removing respirator.
- Limit the number of healthcare workers caring for the patient and track them.
- Visitors should not be permitted unless the patient is critically ill or about to die. In such situations, only close family members should be allowed to enter, wearing PPE as recommended by the institution.
- Perform diagnostic studies if possible, to rule out known causes of community-acquired pneumonia and to rule in COVID-19 disease (SARS-CoV-2 virus).
- Maintain a clean and dry environment with daily cleaning with soap and water and wiped over with 70% alcohol wipes for all surfaces in the healthcare zone.
- Use 70% alcohol on bedside counters and on medical equipment that can tolerate the disinfectant, such as IV poles, at least daily. Note that chlorine is corrosive and also an irritant for the respiratory tract, thus making clinical symptoms worse.
- Supplement oxygen for hypoxemia.
- Use antibacterial agents in case of diagnosed secondary community-acquired pneumonia.
- Use a neuraminidase inhibitor for the treatment of influenza.

Unprotected exposure of healthcare workers to non-isolated asymptomatic or symptomatic patients puts the healthcare workers and other patients at risk. Thus, it is ideal for healthcare workers to undergo self-quarantine for 8-10 days at home before returning to work. During this time daily temperature and clinical condition must be recorded. This practice is important for limiting transmission of SARS-CoV-2 within the healthcare facility. In addition, family members should limit their contact at home with the suspected case during the 10-days of furlough. A member of the family should take responsibility to educate the others on hand hygiene and maintaining a distance of 1 m (3 ft).

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS

Table 2: Management of Suspected COVID-19 Patients

- Isolate the patient and ensure that at least minimum requirements for infection prevention and control are in place as soon as possible.
- Apply standard precautions for all patients.

- Place the patient in an adequately ventilated single room.
- Wear gloves, a gown, eye protection (face shield), and regular surgical masks (N-95 respirator, especially when performing aerosol generating procedures).
- Just before leaving the room, remove the gown, mask, and gloves in the room. Discard in an infectious waste container.
- Perform hand hygiene after removing gloves.
- Limit the number of healthcare workers caring for the patient.
- Limit the number of visitors.
- Perform diagnostic studies if possible, to rule out known causes of community-acquired pneumonia and to confirm COVID-19 disease, SARS-CoV-2.
- Maintain a clean environment. Use 70% alcohol on bedside counters and on medical equipment that can tolerate the disinfectant, such as IV poles, at least daily. Note that chlorine is corrosive and also an irritant for the respiratory tract thus making clinical symptoms worse.
- Supplement oxygen for hypoxemia.
- Use antibacterial agents for community-acquired pneumonia.
- Consider a neuraminidase inhibitor, if available, for treatment of influenza.

In hospital settings, it is important to follow the process to discontinue the droplet or airborne isolation precautions as outlined in table 3. A plan for COVID-19 patients requiring surgeries is outlined in Table 4.

Table 3: Discontinuation of Droplet and Airborne Isolation Precautions in All Settings

- Asymptomatic patients: 10 days after the initial positive test.
- Symptomatic patients: 10 days after symptom onset AND 3 or more consecutive days with no fever and no respiratory symptoms.
- Patients with severe illness and those who are immunocompromised: consider extending the period to 20 days.

- Previously positive patients who develop new symptoms consistent with COVID-19 during the 3 months after the date of the initial episode: repeat testing may be considered if an alternative etiology cannot be identified, in consultation with infectious disease or infection control experts.
- Currently, serologic testing is not indicated to establish the presence or absence of SARS-CoV-2 infection or reinfection.

Table 4: Surgical Care of Suspected or Confirmed Cases in All Settings

- Routine screening for all surgical cases is not widely adopted.
- Anesthesia and intubation to be performed in a negative pressure room, if available or in a well ventilated room, and anesthesiologists to wear N95 respirators.
- Surgical procedures in suspected or confirmed COVID-19 patients should be done with full PPE (using gowns, gloves, masks, and goggles).
- HCWs should use respirators (N95, FFP2, or an equivalent) for AGP, including intubation and procedures involving anatomic regions with high viral loads such as the nose, oropharynx, and respiratory tract.

SUMMARY

The COVID-19 disease is a newly emerging infectious disease caused by a novel coronavirus, SARS-CoV-2. This virus is phylogenetically distinct from previously known human and animal coronaviruses but is closer to the SARS virus. The SARS-CoV-2 virus was first identified in Wuhan city, Hubei, China in December 2019. It emerged in Southern China in November 2019, causing a pandemic. It spreads from person to person via the respiratory tract through droplets and possibly opportunistic aerosols, contact (direct or indirect, airborne transmissions especially when there is poor ventilation), and fomites. While close contact is the most often

considered for transmission, aerosols have also been implicated, therefore good ventilation is essential. To contain this virus and other novel coronaviruses, there is no room for error or relaxation of the highest standards of all features of infection control.

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