COVID-19
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Virus type: betacoronavirus in the same subgenus as the severe acute respiratory syndrome (SARS) virus

Transmission: droplet transmission, virus released in the respiratory secretions when a person with infection coughs, sneezes, or talks can infect another person if it makes direct contact with the mucous membranes; infection can also occur if a person touches an infected surface and then touches his or her eyes, nose, or mouth. Droplets typically do not travel more than six feet (about two meters) and do not linger in the air

Incubation period — The incubation period for COVID-19 is thought to be within 14 days following exposure, with most cases occurring approximately four to five days after exposure

Spectrum of illness severity

report from the Chinese Center for Disease Control and Prevention that included approximately 44,500 confirmed infections with an estimation of disease severity:

- Mild (no or mild pneumonia) was reported in 81 percent.
- Severe disease (eg, with dyspnea, hypoxia, or >50 percent lung involvement on imaging within 24 to 48 hours) was reported in 14 percent.
- Critical disease (eg, with respiratory failure, shock, or multiorgan dysfunction) was reported in 5 percent.
- The overall case fatality rate was 2.3 percent; no deaths were reported among noncritical cases.

According to a joint World Health Organization (WHO)-China fact-finding mission, the case-fatality rate ranged from 5.8 percent in Wuhan to 0.7 percent in the rest of China

Most of the fatal cases have occurred in patients with advanced age or underlying medical comorbidities (including cardiovascular disease, diabetes mellitus, chronic lung disease, hypertension, and cancer)

in Italy, 12 percent of all detected COVID-19 cases and 16 percent of all hospitalized patients were admitted to the intensive care unit; the estimated case fatality rate was 5.8 percent in mid-March
In contrast, the estimated case fatality rate in mid-March in South Korea was 0.9 percent. This may be related to distinct demographics of infection; in Italy, the median age of patients with infection was 64 years, whereas in Korea the median age was in the 40s

Symptomatic infection in children appears to be uncommon; when it occurs, it is usually mild, although severe cases have been reported. The Chinese report only 2 percent of infections were in individuals younger than 20 years old

Symptoms: in adults infected

most common clinical features at the onset of illness were:

- Fever in 99 percent
- Fatigue in 70 percent
- Dry cough in 59 percent
- Lack of appetite in 40 percent
- Muscle aches in 35 percent
- Shortness of breath in 31 percent
- Sputum production in 27 percent

less common symptoms have included headache, sore throat, and rhinorrhea. In addition to respiratory symptoms, gastrointestinal symptoms (eg, nausea and diarrhea) have also been reported in some patients, but these are relatively uncommon

Duration of Symptoms:
According to the WHO, recovery time appears to be around two weeks for mild infections and three to six weeks for severe disease

Laboratory findings — In patients with COVID-19, the white blood cell count can vary. Leukopenia, leukocytosis, and lymphopenia have been reported, although lymphopenia appears most common. Elevated **lactate dehydrogenase** and **ferritin** levels are common, and elevated aminotransferase levels have also been described. On admission, many patients with pneumonia have normal serum **procalcitonin** levels; however, in those requiring intensive care unit (ICU) care, they are more likely to be elevated.

High **D-dimer** levels and more severe **lymphopenia** have been associated with mortality

Imaging findings — Chest CT in patients with COVID-19 most commonly demonstrates **ground-glass opacification** with or without consolidative abnormalities, consistent with viral pneumonia. Case series have suggested that chest CT abnormalities are more likely to be **bilateral**, have a **peripheral distribution**, and involve the **lower lobes**. Less common findings include pleural thickening, pleural effusion, and lymphadenopathy.

What you need to do when suspect CoViD-19 is a patient
When COVID-19 is suspected, infection control measures should be implemented and public health officials notified. Patients who do not need emergent care should be

encouraged to call prior to presenting to a health care facility for evaluation. Many patients can be evaluated regarding the need for testing over the phone.

Testing:
For safety reasons, specimens from a patient with suspected or documented COVID-19 should **not** be submitted for viral culture.
Only in patients who meet the criteria for suspect cases CDC recommends collection of a nasopharyngeal swab specimen for reverse-transcription polymerase chain reaction (RT-PCR);
If initial testing is negative but the suspicion for COVID-19 remains, the WHO recommends resampling and testing from multiple respiratory tract sites

MANAGEMENT

Site of care

Home care — Home management is appropriate for patients with mild infection who can be adequately isolated in the outpatient setting. Management of such patients should focus on prevention of transmission to others, and monitoring for clinical deterioration, which should prompt hospitalization.

Outpatients with COVID-19 should stay at home and try to separate themselves from other people and animals in the household. They should wear a facemask when in the same room (or vehicle) as other people and when presenting to health care settings. Disinfection of frequently touched surfaces is also important, as discussed elsewhere.

United States Centers for Disease Control and Prevention (CDC) recommendations on discontinuation of home isolation are discussed below.

More detailed interim recommendations on home management of patients with COVID-19 can be found on the WHO and CDC websites.

Hospital care — Some patients with suspected or documented COVID-19 have severe disease that warrants hospital care. Management of such patients consists of ensuring appropriate infection control, and supportive care. Clinical guidance can be found on the World Health Organization (WHO) and CDC websites.

Patients with severe disease often need oxygenation support. High-flow oxygen and noninvasive positive pressure ventilation have been used, but the safety of these measures is uncertain, and they should be considered aerosol-generating procedures that warrant specific isolation precautions.

Some patients may develop acute respiratory distress syndrome and warrant intubation with mechanical ventilation; extracorporeal membrane oxygenation may be indicated in patients with refractory hypoxia.

Investigational agents — A number of investigational agents are being explored for antiviral treatment of COVID-19, and enrollment in clinical trials should be discussed with patients or their proxies. A registry of international clinical trials can be found on the WHO website and at clinicaltrials.gov.

Certain investigational agents have been described in observational series or are being used anecdotally based on in vitro or extrapolated evidence. It is important to acknowledge that there are no controlled data supporting the use of any of these agents, and their efficacy for COVID-19 is unknown.

- Remdesivir – Several randomized trials are underway to evaluate the efficacy of remdesivir for moderate or severe COVID-19. Remdesivir is a novel nucleotide analogue that has activity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in vitro and related coronaviruses (including SARS and MERS-CoV) both in vitro and in animal studies. The compassionate use of remdesivir through an investigational new drug application was described in a case report of one of the first patients with COVID-19 in the United States. Any clinical impact of remdesivir on COVID-19 remains unknown.
- Chloroquine/hydroxychloroquine – Both chloroquine and hydroxychloroquine inhibit SARS-CoV-2 in vitro, although hydroxychloroquine appears to have more potent antiviral activity. A number of clinical trials are underway in China to evaluate the use of chloroquine or hydroxychloroquine for COVID-19.
- Lopinavir-ritonavir – This combined protease inhibitor, which has primarily been used for HIV infection, has in vitro activity against the SARS-CoV and appears to have some activity against MERS-CoV in animal studies. The use of this agent for treatment of COVID-19 has been described in case reports, but its efficacy is unclear. In one report of five patients who were treated with lopinavir-ritonavir, three improved and two had clinical deterioration; four had gastrointestinal side effects. It is being evaluated in larger randomized trials.
- Tocilizumab – Treatment guidelines from China's National Health Commission include the IL-6 inhibitor tocilizumab for patients with severe COVID-19 and elevated IL-6 levels; the agent is being evaluated in a clinical trial.

How to protect health care workers

In the health care setting, the World Health Organization (WHO) and CDC recommendations for infection control for suspected or confirmed infections differ slightly:

- The WHO recommends standard, contact, and droplet precautions (ie, gown, gloves, and mask), with eye or face protection [85]. The addition of airborne precautions (ie, respirator) is warranted during aerosol-generating procedures (as detailed below).

  The CDC recommends that patients with suspected or confirmed COVID-19 be placed in a single-occupancy room with a closed door and dedicated bathroom. The patient should wear a facemask if being transported out of the room (eg, for studies that cannot be performed in the room). An airborne infection isolation room

(ie, a single-patient negative pressure room) should be reserved for patients undergoing aerosol-generating procedures (as detailed below).
Any personnel entering the room of a patient with suspected or confirmed COVID-19 should wear the appropriate personal protection equipment: gown, gloves, eye protection, and a respirator (eg, an N95 respirator). If supply of respirators is limited, the CDC acknowledges that facemasks are an acceptable alternative (in addition to contact precautions and eye protection), but respirators should be worn during aerosol-generating procedures.

Aerosol-generating procedures include tracheal intubation, noninvasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy. Nasopharyngeal or oropharyngeal specimen collection is not considered an aerosol-generating procedure.

For health care workers who have had a potential exposure to COVID-19, the CDC has provided guidelines for work restriction and monitoring. The approach depends upon the duration of exposure, the patient's symptoms, whether the patient was wearing a facemask, the type of personal protective equipment used by the provider, and whether an aerosol-generating procedure was performed.

Discontinuation of precautions — The decision to discontinue infection control precautions for patients with COVID-19 should be made on a case-by-case basis in consultation with experts in infection prevention and control and public health officials. Factors to inform this decision include resolution of clinical signs and symptoms and negative results of reverse-transcription polymerase chain reaction (RT-PCR) testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on two sequential paired nasopharyngeal and throat specimens (ie, four specimens total, each handled separately), with each pair collected ≥24 hours apart

Preventing exposure in the community — The following general measures are recommended to reduce transmission of infection:

- Diligent hand washing, particularly after touching surfaces in public. Use of hand sanitizer that contains at least 60 percent alcohol is a reasonable alternative if the hands are not visibly dirty.
- Respiratory hygiene (eg, covering the cough or sneeze).
- Avoiding touching the face (in particular eyes, nose, and mouth).
- Avoiding crowds (particularly in poorly ventilated spaces) if possible and avoiding close contact with ill individuals.
- Cleaning and disinfecting objects and surfaces that are frequently touched. The CDC has issued guidance on disinfection in the home setting; a list of EPA-registered products can be found here.

In particular, older adults and individuals with chronic medical conditions should be encouraged to follow these measures.

If SARS-CoV-2 is prevalent in the community, residents should be encouraged to practice social distancing by staying home as much as possible.

For people without respiratory symptoms, wearing a medical mask in the community is not recommended, even if COVID-19 is prevalent in the area; wearing a mask does not decrease the importance of other general measures to prevent infection, and it may result in unnecessary cost and supply problems.

Individuals who are caring for patients with suspected or documented COVID-19 at home, however, should wear a tightly fitting medical mask when in the same room as that patient.

Individuals who develop an acute respiratory illness (eg, with fever and/or respiratory symptoms) should be encouraged to stay home from school or work for the duration of the illness. Some may warrant evaluation for COVID-19.