

General Principles

1. **Coronavirus Disease 2019 (COVID-19) is caused by SARS-CoV-2, a novel coronavirus first reported on December 2019 in China.** The incubation period ranges from 2-14 days with a reported median of 4- 5 days.
2. **COVID-19 should be considered as part of the differential for any patient presenting with signs/symptoms of a viral illness.** While upper/lower respiratory symptoms and fever are most common, patients may initially be afebrile and present with myalgias, GI, ocular, or ENT symptoms. Cases of myocarditis and neurologic symptoms have also been reported.
3. **There is no one test that is 100% sensitive or specific for COVID-19.** In particular, a single negative NP swab for PCR does not mean that COVID-19 has been ruled-out in a high risk or clinically suspected patient (30%false neg.) Sample quality is also important.
4. **The antiviral drug Remdesivir (IV) recently received FDA EUA approval to treat hospitalized patients with COVID-19. It is not available for outpatients. The FDA revoked EUA approval for hydroxychloroquine on June 15, 2020.**
5. As with any viral illness, **patients with mild disease* and no risk factors for serious illness** can be given instructions to care for themselves at home.** Some reports suggest the potential for clinical deterioration during the second week of illness and recommend that patients at risk for severe disease obtain a home pulse oximeter. The use of smartphones as a tool to measure pulse oximetry is not recommended.
6. **Current medication regimens for patients (without evidence of COVID-19) with pre-existing conditions such as chronic lung disease, hypertension, heart failure, or rheumatologic disease do not need to be changed.** This includes the use of inhaled corticosteroids (ICS), ACE-I/ARBs, and immunomodulatory drugs.
7. **Symptom management should include consideration of preventing and managing known mood disorders, including anxiety.**

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Overview:

The coronaviruses are a large family of viruses that usually cause mild to moderate upper respiratory tract illnesses, such as the common cold.

Most coronaviruses circulate among animals including pigs, camels, bats and cats. Only seven coronaviruses are known to cause human disease, four of which are mild.

Three of the coronaviruses have been associated with serious disease in people. These diseases are severe acute respiratory syndrome (SARS) , which emerged in late 2002 and disappeared by 2004; Middle East respiratory syndrome (MERS), which emerged in 2012 and remains in circulation in camels; and COVID-19 (Coronavirus disease 2019). COVID-19 is caused by the novel coronavirus SARS-CoV-2. Based on genetic sequencing, the virus is thought to have originated in November 2019 in the city of Wuhan, China. There is no current evidence to indicate that the virus originated in a laboratory. (1)

On March 19, 2020, California state ordered all residents to stay at home or place of residence unless they were required to maintain continuity of operations in 16 identified federal critical infrastructure sectors <https://www.cisa.gov/identifying-critical-infrastructure-during-covid-19>

[Phased re-opening](#), as outlined by the State of California, began with stage 2 in most counties on May 8th. Some counties are charting their own path to reopening with some possibly proceeding to stage 3 on June 15, 2020. The state continues to recommend that higher risk individuals (over 65 or with serious medical conditions) should continue to stay home until Stage 4. These at-risk individuals should continue to minimize errands by obtaining grocery or meal deliveries or requesting assistance from friends, neighbors, or family. Cases of COVID-19 across the state continue to rise steadily as the virus is still prevalent in the community. Social distancing permitted rampant viral spread and slowed transmission (flattened the curve).

Current medication regimens for patients (without evidence of COVID-19) with pre-existing conditions such as chronic lung or heart disease, or rheumatologic diseases do not need to be changed. This includes the use of inhaled corticosteroids (ICS) in asth-

ma and ACE-I/ARBs in hypertension. There is no evidence that routine discontinuation of treatment is beneficial. (2) For patients on immunomodulatory therapies, any changes should be made in close consultation with the patient's prescribing physician as discontinuing these medications may result in exacerbation of disease or loss of response when the agent is reintroduced.

Spectrum of disease:

An analysis by Johns Hopkins Public Health indicates that slightly >97% of people who develop symptoms of SARS-CoV-2 infection will do so within 11-12 days of exposure, with a median incubation period of about 5 days. In contrast, human coronaviruses that cause common colds have mean incubation periods of about three days. (3) Public health recommendations of a 14-day quarantine period are designed to minimize both transmission as well as the individual and societal costs of quarantine.

COVID-19 should be considered as part of the differential for any patient presenting with signs/symptoms of a viral illness. While upper/lower respiratory symptoms and fever are most common, patients may initially be afebrile particularly in the outpatient setting. The list of COVID-19 associated symptoms continues to expand. Myalgias, GI, ocular, ENT and neurologic symptoms as well as cases of myocarditis have been reported.

The spectrum of illness ranges from mild to critical. Most infections are not severe, with patient risk factors influencing disease severity. According to initial data from China:

- Mild (no or mild pneumonia) reported in 81%.
- Severe disease (e.g., with dyspnea, hypoxia, or >50% lung involvement on imaging within 24 to 48 hours) reported in 14%
- Critical disease (e.g., with respiratory failure, shock, or multi-organ dysfunction) reported in 5%.

Note, that these data are based on a Chinese cohort of >72,000, up through February 2020 that was published in JAMA. (4) Case fatality rates do vary between countries. (5) As of May 26, 2020, it appears that the overall US case fatality rate is about 5.8% (6). This varies regionally and is affected by multiple factors including age and the presence of co-morbidities. *Severe illness leading to hospitalization, including ICU admission and death, can occur in adults of any age with COVID-19.* (6,7,8)

COVID-19 Testing

The CDC updated its priority categories to guide who should receive testing as of June 12, 2015 as described below. Testing capacity is now widely available and the CDC emphasizes that clinician determination can warrant testing. Some outpatient clinics require at least a single negative screening test prior to in-person visits. Most patients who are hospitalized or receiving an elective surgery at a hospital are also receiving testing for COVID-19. Currently, the CDC does not recommend the use of antibody tests to diagnose acute infection.

Updated CDC testing criteria

- [Testing individuals with signs or symptoms consistent with COVID-19](#)
- [Testing asymptomatic individuals with recent known or suspected exposure to SARS-CoV-2 to control transmission](#)
- [Testing asymptomatic individuals without known or suspected exposure to SARS-CoV-2 for early identification in special settings](#)
- [Testing to determine resolution of infection \(i.e., test-based strategy for Discontinuation of Transmission-based Precautions, HCP Return to Work, and Discontinuation of Home Isolation\)](#)
- [Public health surveillance for SARS-CoV-2](#)

Estimates of testing sensitivity, depending on the platform used, are as low as 64-75%. Sensitivity can be decreased by *low viral load* (e.g. early on during illness). Samples that are initially negative may become positive with repeat testing, as symptoms worsen. *Sample site* is also important as lower respiratory samples are more likely to be positive compared to those obtained from the upper respiratory tract. Finally, *sample quality* is important.

Swirl and Twirl – a good nasopharyngeal swab requires inserting the swab beyond the turbinates and involves several seconds of swirling and twirling. Note, with the Abbott ID NOW SARS-CoV-2, samples in viral media will result in increased false negative rates. Estimates of co-infection with other viruses or bacteria are as high as 20%. Co-infection with influenza or other respiratory viruses may be a risk factor for severe illness. Depending on the lab, two samples may be required if respiratory pathogen or influenza testing is requested in addition to COVID-19. Examples include:

1. Flocked swab Nasopharyngeal (NP) plus oropharyngeal (OP)
2. Flocked swab Mid-Turbinate plus OP
3. Synthetic Swab Mid-turbinate plus OP

Presenting Signs and Symptoms

COVID-19 should be considered as part of the differential for any patient presenting with signs/symptoms of a viral illness. While upper/lower respiratory symptoms and fever are most common, patients may initially be afebrile or present with non-respiratory manifestations such as conjunctivitis, loss of taste or smell, nausea, confusion or diarrhea. Place a surgical mask on the patient and proceed with exam while using Contact and Respiratory Droplet precautions. Additional laboratory evaluation in the workup of suspected COVID-19 in the OP setting has not been well-established.

CONSIDER COVID-19 in a patient with any of the following NEW symptoms:

- Systemic: Fever, myalgias
- Respiratory: Cough, dyspnea, URI sx
- GI: N/v or diarrhea
- ENT: Taste or smell disorders
- Eye: conjunctivitis
- High risk travel, close contact with a known case
- Age > 80 with altered mentation (confused, dizzy, falls)

Clinical Presentation

- Fever: Fever course among patients with COVID-19 may be prolonged and intermittent. Patients can be afebrile at presentation
- Myalgias, dizziness
- Respiratory: Cough, dyspnea
- URI : HA, sore throat, rhinorrhea
- GI: N/V, diarrhea, abdominal pain, anorexia
- Cardiac: multiple reports of myocarditis are emerging
- ENT: Taste or smell disorder may be initial presenting symptom
- Eye: Conjunctivitis

Labs and Biomarkers

- CBC with diff, BMP, LFTs, CRP, procalcitonin
- Higher inflammatory markers (CRP, D-dimer, IL-6, ferritin, TNFalpha) associated with severe disease, death

Labs and Biomarkers

- WBC usually normal or low, leukopenia and lymphopenia commonly seen. leukocytosis <25%
- platelet usually normal, low in <35%
- AST/ALT increased in 4-35%
- CRP increased in 61-86[^], LDH increased in 27-75%
- PCT > or + 0.5 in 5-10% (higher% if severe or ICU)
- Troponin elevated in 7-28%, associated with increased risk of

Imaging (only recommended for patients with risk factors and/or moderate-severe manifestations)

- CXR
- Consider Chest CT to evaluate for other etiologies (16)

Imaging

- Abnormal CXR in 60-77%, chest CT in 86-95%
- Bilateral in > 75% (can be unilateral if mild, early)
- Most common CXR findings: bilat patchy opacities
- Most common CT findings: bilat GGO and patchy consolidations in a peripheral distribution (>75%)

Triage

***MILD DISEASE/absence of risk factors**

- Afebrile
- No SOB/dyspnea, hypoxia, or evidence of pneumonia
- No malaise, confusion, or lethargy

****Risk factors for SEVERE/FATAL DISEASE**

- Age > 65
- Immunocompromised (oncology, transplant, immunosuppressive meds, HIV, other known immunodeficiency)
- Morbid obesity (BMI > 40)
- Pregnancy
- Chronic lung disease
- Cirrhosis
- Cardiovascular disease
- End stage renal disease
- Diabetes
- Hypertension
- Smoking (and possibly vaping)

Criteria for home care (CDC)

- The patient is stable enough to receive care at home.
 - If being sent home with moderate disease (including O₂ sat < 95%, pulse > 90, positive CXR) and/or risk factors present, consider providing patient with an ambulatory pulse oximeter. The use of smartphones to measure oxygen saturation via an application is not recommended. (11, 12) Patients need to be closely monitored.
- Appropriate caregivers are available at home.
 - There are household members who may be at increased risk of complications from COVID-19 infection (e.g., people >65 years old, young children, pregnant women, people who are immunocompromised or who have chronic heart, lung, or kidney conditions).
- There is a separate bedroom where the patient can recover without sharing immediate space with others.
- Resources for access to food and other necessities are available.

- The patient and other household members have access to appropriate, recommended personal protective equipment (at a minimum, gloves and facemask) and are capable of adhering to precautions recommended as part of home care or isolation (e.g., respiratory hygiene and cough etiquette, hand hygiene).

If stable, but considered to be a high risk discharge (e.g. homeless, living in a shelter, nursing home, LTAC, SNF, assisted living) contact the facility and/or local health department for further guidance.

Treatment (10)

To date, the only antiviral medicine approved to treat COVID-19 is remdesivir which is available for hospitalized patients only.

8. [The FDA revoked its EUA for hydroxychloroquine on June 15 2020.](#)
9. There is no good data to support the use of NSAIDs during acute respiratory infections. Use of NSAIDs is associated with increased risk of heart attack and stroke in adults. In general, use the lowest effective dose for the shortest period of time. (14)
10. No data to indicate that ICS need to be stopped in asthmatics. (2)
11. Smoking cessation should continue to be recommended.
12. In most cases, there is no need to specifically treat fever.

Treatment remains limited to supportive care, as for any mild viral illness

The following general guidelines may be considered and are not specific for COVID-19.

1. Rest.
2. Drink plenty of clear fluids (cautiously, in patients with CHF) — water, broth, and sports drinks (can dilute 50:50, to avoid excess sugar intake or avoid entirely in diabetics)
3. Consider using a humidifier or saline spray to help with a stuffy nose.
4. While there is no data to support the use of supplements in COVID-19, (13) the following may be considered:
 - a. Vitamin C (doses > 2000 mg can cause kidney stones, diarrhea and nausea)
 - b. Zinc (3-5 days)
 - Supplements come in pill and liquid form
 - Food sources include red meat, poultry, oysters, fortified cereals, whole grains, beans and nuts.
 - Tolerable upper limit (including dietary intake) for adults 19 years and up = 40 mg.

5. Anxiety (14)

May be a significant source of distress and accentuate or cause shortness of breath/dyspnea. Counseling may be beneficial to boost ability to cope, or if emotions are running high. Communicate with empathy (15), address the patient's concerns, including potential social stigma. Examples include:

What they say	What you say
I'm scared.	This is such a tough situation. <i>I think anyone would be scared.</i> Could you share more with me?
I need some hope.	Tell me about the things you are hoping for? <i>I want to understand more.</i>
You people are incompetent!	I can see why you are not happy with things. <i>I am willing to do what is in my power to improve things for you.</i> What could I do that would help?
I want to talk to your boss.	I can see you are frustrated. <i>I will ask my boss to come by as soon as they can. Please realize that they are juggling many things right now.</i>
Do I need to say my goodbyes?	I'm hoping that's not the case. And I worry time could indeed be short. What is most pressing on your mind?

Some specific suggestions (little direct evidence, tailored to patient's needs) include:

- a. Minimize media exposure
- b. Provide trusted sources to access information about the COVID-19 pandemic (ATS, CDC)
- c. Practice meditation and mindfulness (<https://www.nccih.nih.gov/health/meditation-in-depth>)
- d. Sleep hygiene (https://www.cdc.gov/sleep/about_sleep/sleep_hygiene.html)
- e. Connect with family and friends via telephone, online

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14. <https://curriculum.covidstudentresponse.org/module-4-communicating-information-about-covid-19>
15. [Coping with Stress](#)
16. [The Role of Chest Imaging in Patient Management during the COVID-19 Pandemic: A Multinational Consensus Statement from the Fleischner Society,](#)

Appendix A

NIH [COVID-19 Clinical Trials](#)

COVID-19 Clinical Trials in California

1. [UC Davis](#)
2. [UCLA](#)
3. [UCSD](#)
4. [UCSF](#)
5. [USC](#)
6. [CEDARS-SINAI](#)
7. [STANFORD](#)

CTS gratefully acknowledges its Executive Committee, under the leadership of President Laren Tan, the Clinical Practice Committee and its chair, Dr. Asha Devereaux, and CTS' editors: Dr. Angela Wang, Chris Garvey FNP, MSN, MPA, Dr. Sachin Gupta and Dr. Nancy Hsu