Coronavirus

Table of Contents

Genex Clinical Guidelines Tool Disclaimer

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Description: Coronavirus

ICD9 ICD9
ICD10 ICD10
CPT CPT

Coronaviruses are a large family of viruses that may cause a range of illnesses from the common cold to Severe Acute Respiratory Syndrome (SARS). Coronaviruses may cause illnesses in both humans and animals. *Investigations regarding the novel coronavirus, SARS CoV-2*, *are ongoing and recommendations from the Centers from Disease Control (CDC) may change regarding testing, infection prevention, and treatment as new information is obtained (*IPAC, 2020).

The objective of this guideline is to provide an overview of coronaviruses, concentrating on the evolving COVID-19 pandemic. Information on COVID-19 is monitored on an ongoing basis and this guideline is undergoing frequent updates.

The target population includes working-age adults who are at risk for a coronavirus infection. Specifically, those at risk for COVID-19:

- Individuals who have traveled from affected geographic area within 14 days of symptom onset
- Individuals who have had close contact with an individual diagnosed with COVID-19 infection
    - Healthcare workers
    - First responders
    - Frontline workers
        - Those who must provide their labor in person
    - Those caring for an individual sick with coronavirus
    - Those working in the travel industry
- Individuals with comorbidities and risk factors

The guideline also serves to answer specific questions, such as:

- What is a coronavirus?
- What are the types of human coronaviruses?
- What is COVID-19?
- What are the available vaccines for COVID-19?
- What is long COVID?
- What are the symptoms of COVID-19?
- How is COVID-19 diagnosed?
- How are coronaviruses treated?
- What are some of the Federal and State Responses to COVID-19?

Human coronaviruses were first identified in the 1960s. They are named for the crown-like spikes on their surface. The four main sub-groupings are known as alpha, beta, gamma, and delta. The seven coronaviruses that can infect people are (CDC, 2020b):

- 229E (alpha coronavirus)
- NL63 (alpha coronavirus)

- OC43 (beta coronavirus)
- HKU1 (beta coronavirus)
- MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)
- SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS)
- 2019 Novel Coronavirus SARS CoV-2 (COVID-19)
    - Investigations regarding COVID-19 are ongoing and recommendations from the Centers for Disease Control (CDC) may change regarding testing, infection prevention, and treatment as new information is obtained

229E, NL63, OC43, and HKU1 are the most common human coronaviruses. They are spread through close contact, which commonly includes contamination of hands from person-to-person contact. These coronaviruses are typically found in patients with acute respiratory symptoms, most commonly a mild upper respiratory tract infection, the common cold. Occasionally they are detected in patients with more serious respiratory illnesses including pneumonia, bronchiolitis, and croup (CDC, 2020b; Goldman, 2020). In rare cases, animal coronaviruses are spread to people. Three recent examples of this are COVID-19, SARS-CoV, and MERS-CoV (IPAC, 2020).

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus called SARS-associated coronavirus (SARS-CoV). In February 2003, SARS was first reported in Asia. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the SARS global outbreak of 2003 was contained. There have not been any known cases of SARS since 2004 (McIntosh, 2021).

Middle East Respiratory Syndrome (MERS) is caused by a coronavirus. It was first reported in Saudi Arabia in 2012 and has since spread to several other countries, including the United States. Most people infected with MERS-CoV developed severe respiratory illness, including fever, cough, and shortness of breath. Approximately 3 or 4 out of every 10 patients with MERS have died (McIntosh, 2020b).

COVID-19:
At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei province of China. The virus has been named SARS-CoV-2, and the disease it causes is coronavirus disease 2019 or COVID-19. The novel coronavirus has also been known as 2019-nCoV (CDC, 2021a; McIntosh, 2020a).

Many of the originally diagnosed patients had a link to a large seafood and live animal market in Wuhan, China, which suggested an animal-to-person spread. As the outbreak progressed, most laboratory-confirmed cases did not have an association with the market, and cases were identified among health care workers and other contacts of patients with COVID-19 infection. Human-to-human transmission has been confirmed globally. Most often person-to-person spread happens among close contacts via respiratory or aerosolized droplets from an infected person coughing, sneezing, or talking within 6 feet of an uninfected person or via direct contact with infected secretions. The virus may be transmitted by asymptomatic individuals. Infection may also occur if a person's hands are contaminated by these secretions or by touching contaminated surfaces and then they touch their eyes, nose, or mouth. However, contaminated surfaces are not thought to be a major route of transmission. It is unknown how long SARS-CoV-2 can last on surfaces (CDC, 2021a; McIntosh, 2022; Reed, 2022).

Multiple variants of the COVID-19 virus have been identified globally. The CDC in collaboration with a SARS-CoV-2 Interagency Group (SIG) has established four classifications for the SARS-CoV-2 variants:

Variants Being Monitored (VGM), Variant of Interest (VOI), Variant of Concern (VOC), and Variant of High Consequence (VOHC). As of December 1, 2021, there are not any SARS-CoV-2 variants that have risen to the level of high consequence.

There is currently one variant of concern in the United States:

- Omicron (B.1.1.529, BA.1, BA.1.1, BA.2, BA.3, BA.4 and BA.5): Initially identified in South America, first detected in the United States in November 2021.

The incubation period of SARS-CoV-2 is thought to be within 14 days following exposure. The virus may be detected 1 to 2 days before symptom onset. The potential to transmission of SARS-CoV-2 begins prior to the development of symptoms and is highest early in the course of illness when the RNA levels from the respiratory specimens are the highest.

The clinical picture of COVID-19 is not fully clear. The most commonly reported symptoms include cough, myalgias and headache. The symptoms have ranged from little to no symptoms to critically ill and dying. There are not any specific symptoms or signs that can reliably distinguish COVID-19 from other viral respiratory infections. Although many of the reported infections are not severe, approximately 20 percent of confirmed patients have had critical illness (CDC, 2021c; McIntosh, 2020a).

Possible risk factors for progressing to severe illness may include, but are not limited to (CDC, 2022l; CDC, 2021c; McIntosh, 2020a):

- Older age
- Underlying chronic medical conditions such as:
    - Lung disease
        - Chronic Obstructive Pulmonary Disease (COPD)
        - Asthma (moderate-to-severe)
        - Bronchiectasis
        - Bronchopulmonary dysplasia
        - Interstitial lung disease
        - Cystic fibrosis
        - Pulmonary hypertension
        - Pulmonary embolism
    - Cancer
    - Cardiovascular disease
        - Heart failure
        - Coronary artery disease
        - Congenital heart disease
        - Cardiomyopathies
        - Pulmonary Hypertension
        - Hypertension
            - Those with hypertension as the only comorbidity are not considered at higher risk for severe illness (CDC, 2021c)
    - History of stroke or cerebrovascular disease
    - Renal disease
    - Liver disease
    - Diabetes (type 1 or type 2)
    - Sickle Cell Disease

- Immunocompromising conditions
- Solid organ or blood stem cell transplant
- HIV
- Pregnancy
- Down Syndrome
- Obesity (body mass index [BMI] of 30 kg/m2 or higher)
- Smoking
- Dementia
- Substance abuse disorders
- Disabilities
    - People with any type of disability that makes it more difficult to do certain activities or interact with the world around them, including people who need help with self-care or daily activities
- Mental health conditions including depression and schizophrenia spectrum disorders
- Tuberculosis

Additional underlying conditions that may represent an increased risk of severe COVID-19 include (Cennimo, 2022a):

- Neurologic conditions
- Pregnancy
- Pulmonary fibrosis

Evaluation and testing for COVID-19:
There are currently two types of COVID-19 tests, viral tests and serology tests. These tests serve different purposes:

- Viral Tests
    - Viral test is an oral or nasal swab or saliva test that looks for evidence of an active viral infection
    - Polymerase Chain Reaction (PCR) or Nucleic acid amplification test (NAAT):
        - Presence of a virus's genetic material
        - Considered the most accurate test to determine if individual was recently infected
    - Antigen test
        - Test for a specific protein on a virus's surface.
        - Produce results more quickly but may be less sensitive.
- Serology/Antibody Test
    - Blood test that looks for evidence of prior infection
    - Does not diagnose an active infection or identify who is protected from reinfection
    - Detectable antibodies may take several days to weeks to develop

The diagnosis of COVID-19 cannot be made without microbiologic testing. When possible, all symptomatic patients with suspected infection should undergo testing. However, testing for COVID-19 may not be readily accessible in all situations. Providers should use their judgment to determine if a patient has signs and symptoms compatible with COVID-19 and whether the patient should be tested. The diagnosis of COVID-19 may be made presumptively based on a compatible clinical presentation in the setting of an exposure risk, particularly when no other cause of the symptoms is evident due to limited availability. Clinicians are encouraged to test for additional respiratory pathogens (Caliendo & Hanson, 2022; CDC, 2021c; ODG by MCG, 2021a).

The decision to test for COVID-19 should be determined by:

- Signs and symptoms
- Local epidemiology
- If the patient has had close contact with a confirmed COVID-19 patient or a history of travel from an area with sustained transmission within 14 days of symptom onset

The Infectious Diseases Society of America (IDSA) has suggested priorities for testing when testing capacity is limited. High-priority individuals include hospitalized patients (especially critically ill patients with unexplained respiratory illness) and symptomatic individuals who are health care workers or first responders, work or reside in congregate living settings, or have risk factors for severe disease (Caliendo & Hanson, 2022).

The Center for Disease recommends testing for current infection in the following situations (CDC, 2022m):

- Those with symptoms of COVID-19
- At least five days after known or suspected close contact (within 6 feet for a total of 15 minutes or more over a 24-hour period) with someone with confirmed COVID-19; regardless of vaccination status
    - People who have tested positive for COVID-19 within the past 30 days and recovered do not need to get tested following an exposure as long as they do not develop new symptoms
    - Individuals may continue to test positive for some time after a positive test result. Antigen tests may remain positive for a few weeks after the initial positive. NAATs may remain positive for up to 90 days. Reinfections can occur within 90 days, which can make it hard to know if a positive test indicates a new infection. Consider consulting a healthcare provider regarding individual circumstances.
- For screening (schools, workplaces, congregate settings, etc.)
- Those who have been asked or referred to get tested by their healthcare provider, or state, tribal, local or territorial health department
- Prior to and after travel
- Note: Individuals that are tested should self-isolate at home until the test results are known, and then adhere to the health care provider's advice

Close contact is defined as being within approximately 6 feet (2 meters) for a cumulative total of 15 minutes or more over a 24-hour period of a person with symptoms of COVID-19, in the period from 2 days before symptom onset until they meet criteria for discontinuing home isolation. For those in close contact with asymptomatic individuals the timing is the two days prior to the date of specimen collection until they meet criteria for discontinuing home isolation. Factors to consider when defining close contact include (CDC, 2022b):

- Closer distance likely increases exposure risk
- Duration of exposure
    - Longer exposure time likely increases exposure risk
- If the infected individual has symptoms
    - The period around onset of symptoms is associated with the highest levels of viral shedding

- If the infected person was likely to generate respiratory aerosols (i.e., coughing, singing, shouting)
- Vaccination status
- Environmental factors
    - Crowding
    - Adequacy of ventilation
    - Indoor or outdoor exposure

Any patients that meet the criteria for person under investigation (PUI) for COVID-19 should be reported to the infection control personnel at their healthcare facility and their local or state health department. A state healthcare department will then contact the Center for Disease Control's Emergency Operations Center.

Quarantine and Isolation:
Isolation is used to separate those that are infected from those that are not. While under isolation the person should not leave the house (unless to seek medical care), monitor their health and separate from other household members. The length of time for isolation is based on multiple factors for different situations. Quarantine keeps someone who was in close contact with someone who has COVID-19 away from others (CDC, 2022c).

The below recommendations are current as of September 6, 2022. This information changes frequently. The most up to date guidance can be found at:

- https://www.cdc.gov/coronavirus/2019-ncov/your-health/isolation.html

The Center for Disease Control provides recommendations for precautions to be used after a close contact with someone who has COVID-19 (CDC, 2022d):

- The date of exposure is day 0 and Day 1 is the first full day after your last contact with a person who has had COVID-19
- Masks should be worn as soon as aware of exposure and continued for 10 full days
- Avoid travel
- Avoid being around those who are at high risk
- Monitor for symptoms:
    - Fever
    - Cough
    - Shortness of breath
- Isolate immediately and test if symptoms develop
- Get tested at least 5 days after the last exposure
    - Continue to wear a mask until day 10 if negative
    - Isolate immediately if test is positive

The Center for Disease Control provides the following recommendations for COVID-19 isolation (CDC, 2022c)

- Day 0 is the first day of symptoms or the day tested (not the day that the positive test result was received)
- Day 1 is the first full day after symptoms developed or your test specimen was collected.
- Those with positive test for COVID-19 or symptoms, should isolate for at least 5 days.

    - Stay home and isolate from other members of the household for at least 5 days
        - Stay in a separate room from other household members, if possible.
        - Use a separate bathroom, if possible.
        - Take steps to improve ventilation at home, if possible.
        - Do not share personal household items, like cups, towels, and utensils.
        - Wear a well-fitted mask if person must be around others in the home
        - Wear a high-quality mask if around others in home or public
        - Do not travel
- Ending isolation
    - If symptoms are present; after 5 full days if fever-free for 24 hours (without the use of fever-reducing medication) and symptoms are improving
    - Those who were asymptomatic may end isolation after 5 full days after the positive test
        - Masks should be worn through day 10 OR after two sequential negative tests 48 hours apart
    - Those who were severely ill with COVID-19 and those with a weakened immune system may need to isolate longer and may require testing with a viral test to determine to end isolation
        - Consult with the healthcare provider
    - All individuals who test positive for COVID-19 should take precautions until day 10
        - Wear a well-fitted mast for 10 full days around others inside the home or in public
        - Avoid travel
        - Avoid being around those who are at high risk

Vaccination:
There are currently four vaccines available for the prevention of COVID-19. The Pfizer-BioNTech and Moderna vaccines are both messenger RNA vaccines, also known as mRNA vaccines. Messenger RNA vaccines teach the cells how to make a protein, which triggers an immune response. The Pfizer-BioNTech vaccine is FDA approved for the prevention of COVID-19 disease in individuals 12 years of age and older, marketed as COMIRNATY and is available under emergency use authorization (EUA) for individuals 6 months through 11 years of age. For those 5 years of age and older it is given in 2 shots, 21 days apart. Individuals 6 months through 4 years receive 3 doses of Pfizer-BioNTech in the primary series. The first and second doses are separated by three to eight weeks and the second and third doses are separated by at least eight weeks. The Moderna vaccine is FDA approved for individuals 18 and older, brand name Spikevax and available under EUA for those ages 6 months and older. It is given in 2 shots, 4 to 8 weeks apart. An 8-week interval may be optimal for some individuals, especially for males ages 12 to 39 years. A shorter interval (3 weeks for Pfizer-BioNTech; 4 weeks for Moderna) between the first and second doses remains the recommended interval for: people who are moderately or severely immunocompromised; adults ages 65 years and older; and others who need rapid protection due to increased concern about community transmission or risk of severe disease (Cennimo, 2022a; CDC, 2022k; FDA, 2022b).

The Janssen/Johnson and Johnson COVID-19 vaccine is an adenovirus viral vector vaccine. This vaccine uses a modified version of the adenovirus that results in the cells making a small fragment of the SARS-CoV-2 virus called the spike protein, which triggers an immune response. Viral vector vaccines do not affect or alter the DNA in any way. The Janssen/Johnson and Johnson is approved for those 18 years of age and older and administered as a single injection. Reports of adverse events following the administration of the vaccine suggest an increased risk of thrombosis with thrombocytopenia syndrome. On April 13, 2021, the U.S. Food and Drug Administration and the Centers for Disease Control and Prevention recommended a pause in administration for a safety review. The safety review of the available

data determined that the vaccine's known and potential benefits outweigh its known and potential risks and that the chance of thrombosis with thrombocytopenia syndrome (TTS) occurring is very low. The pause was lifted on April 23, 2021 with an updated warning directed at women under 50 who have an increased risk for a rare but serious blood clot disorder called TTS. The Janssen vaccine's warning was updated again on July 13, 2021 to include the observed increased risk of Guillain-Barré Syndrome (GBS) following vaccination. The Vaccine Adverse Event Reporting (VAERS) data identified 100 preliminary reports of GBS following vaccination with the Janssen vaccine after approximately 12.5 million doses administered. The available evidence suggests an association between the Janssen vaccine and increased risk of GBS, it is insufficient to establish a causal relationship. On December 14, 2021 the CDC stated that the Pfizer and Moderna mRNA COVID-19 vaccines should be preferred over the use of the Johnson & Johnson (J&J) shot for all adults because the J&J shot carries the risk for a rare but potentially fatal adverse effect that causes blood clots and bleeding in the brain. The statement leaves the J&J vaccine on the market and available to patients who are at risk for a severe allergic reaction to the mRNA vaccines. It also remains available for those individuals who choose the J&J vaccine after being informed about the risks (Cennimo, 2022a; FDA, 2022b).

Individuals who receive the Johnson and Johnson vaccine should monitor for possible symptoms of blood clot, such as (CDC, 2021i):

- Blood clot, such as (CDC, 2021i):
    - Severe or persistent headaches or blurred vision
    - Shortness of breath
    - Chest pain
    - Leg swelling
    - Persistent abdominal pain
    - Easy bruising or tiny blood spots under the skin beyond the injection site
- Guillain-Barré Syndrome (GBS)
    - Weakness or tingling sensations, especially in the legs or arms, that's worsening and spreading to other parts of the body
    - Difficulty walking
    - Difficulty with facial movements, including speaking, chewing or swallowing
    - Double vision or inability to move eyes
    - Difficulty with bladder control or bowel function

The Novavax vaccine is the fourth vaccine authorized by the Food and Drug Administration (FDA) in the U.S. for the prevention of COVID-19. It is a protein subunit vaccine. The Novavax vaccine directly injects a version of the spike protein plus an adjuvant into the body and stimulates the immune system leading to the production of antibodies and T-cells. The version of the spike protein has been formulated in a laboratory as a nanoparticulate and does not have genetic material inside and cannot cause disease. The primary vaccine consists of two doses given three to eight weeks apart. It is approved for individuals 18 years and older (CDC, 2022k).

Side effects from COVD-19 vaccines are common and signal that the body is building protection against the virus. These side effects may affect the recipient's ability to perform daily activities, but they should disappear within a few days. Side effects may be more intense following the second injection. Common side effects include (Edwards & Orenstein, 2022):

- On the injected arm:
    - Pain
    - Redness

    - Swelling
- Systemic reactions:
    - Fever
    - Chills
    - Fatigue
    - Myalgia
    - Headache

A person is considered fully vaccinated after receiving all doses in the primary series and all recommended boosters, when eligible (CDC, 2022f).

There are different COVID-19 vaccine recommendations for people who are moderately or severely immunocompromised. See the link below for up to date vaccine recommendations in this population:

- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html

Additional vaccine dose and Booster dose:
An additional dose may be administered when the initial immune response following a primary vaccine series is likely to be insufficient. At this time, an additional dose of mRNA COVID-19 vaccine after the initial two doses is recommended and approved for individuals who are moderately to severely immunocompromised. This includes the following individuals (CDC, 2022e):

- Receiving active cancer treatment for tumors or cancers of the blood
- Received an organ transplant and are taking medicine to suppress the immune system
- Received a stem cell transplant within the last 2 years or are taking medicine to suppress the immune system
- Moderate or severe primary immunodeficiency (such as DiGeorge syndrome, Wiskott-Aldrich syndrome)
- With advanced or untreated HIV infection
- Active treatment with high-dose corticosteroids or other drugs that may suppress your immune response

A booster dose is an additional dose of vaccine administered when the initial sufficient immune response to a primary vaccine is likely to have waned over time. A gradual reduction in COVID 19 vaccine effectiveness has been observed against asymptomatic and mild symptomatic infections with the delta variant of SARS CoV-2 beginning around 6 months after primary series vaccination. For those 18 years of age and older Pfizer-BioNTech, Moderna, or Janssen booster vaccine can be used following any of the primary series vaccination. This is known as “Heterologous boosting” or “Mix and Match”. When the booster is the same as the primary series, this is called "Homologous boosting". When the booster is different from the primary series, this is known as "Heterologous boosting" or "Mix and Match". An updated booster has been developed to protect against both the original virus that causes COVID-19 and the Omicron variant BA.4 and BA.5. This updated booster is called "bivalent". The previous booster only protects against the original virus and is called "monovalent". Pfizer and Moderna have both developed updated (bivalent) COVID-19 boosters. The indication and timing of the booster dose depends on which primary series was administered. Booster vaccination with Pfizer-BioNTech or Moderna are preferred, but J&J/Janssen COVID-19 vaccine may be considered in some situations. Novavax is not authorized for use as a booster dose at this time (CDC, 2022e).

Booster vaccination with bivalent Pfizer-BioNTech or Moderna are preferred in most situations, but J&J/Janssen COVID-19 vaccine may be considered in some situations. The CDC recommends everyone

aged 5 years and older should receive a bivalent booster shot 2 months after their initial vaccination series or last booster. Children aged 6 months to 4 years who completed the Moderna COVID-19 vaccine primary series should also receive an updated bivalent booster shot. There is no booster recommendation for children aged 6 months–4 years who got the Pfizer-BioNTech COVID-19 vaccine primary series (CDC, 2022e; CDC, 2022f).

*For the most current CDC COVID-19 vaccine booster recommendations see:

- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html

People 12 years and older with certain kinds of immunocompromise and individuals 50 years or older may receive a second booster dose of either the Pfizer-BioNTech or Moderna COVID-19 vaccine at least 4 months after receiving a first booster dose of any authorized or approved COVID-19 vaccine. For individuals with certain kinds of immunocompromise, the Pfizer-BioNTech COVID-19 Vaccine is authorized for ages 12 and older, and the Moderna COVID-19 Vaccine is authorized for ages 18 and older (CDC, 2022e; CDC, 2022f).

Long-term symptoms/ Complications:
A portion of people infected with COVID-19 do not fully recover within a few weeks. Patients with prolonged illness are called “COVID long-haulers”. This has also been referred to as post-COVID-19 syndrome, postacute COVID-19 syndrome, long COVID or post-acute sequelae of SARS-CoV-2 infection (PASC or P-A-S-C). The National Institute for Health and Care Excellence defines post-COVID-19 syndrome as the signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis. Long-term effects are not only reported in individuals with severe illness, but also in those who were originally asymptomatic or had a mild case of COVID19. A study by Logue et al (2021) found that 84.7% of those with persistent symptoms were individuals with mild illness (Logue, 2021). There is limited information on the prevalence, duration, etiology, and treatment strategies for the persistent symptoms (Mikkelsen & Abramoff, 2021; NICE, 2021a; NIH, 2021b). The study by Carfì et al (2020) found 87.4% of patients that recovered from COVID-19 had at least 1 symptom that persisted, particularly fatigue and dyspnea.

According to the World Health Organization, post COVID-19 is a condition in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually three months from the onset of COVID-19, with symptoms that last for at least two months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, and cognitive dysfunction, The symptoms generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time. This definition was released on October 6, 2021 and is subject to change (WHO, 2021b).

The reported ongoing complications have ranged from mild fatigue to multiple organ failure. Some of the symptoms and complications that have been reported to persist include (AAPM&R, 2022; Ahmed, 2020; Cennimo, 2022a; Choo, 2021; Hackensack Meridian Health, 2020; Logue, 2021; NIH, 2022; Prescott, 2020; Stiepan, 2020):

- Long-term symptoms:
    - Fatigue
        - Most common persistent symptom
        - Described as feeling of weariness, tiredness or lack of energy the persists
        - May be physical, cognitive or emotional
        - May be intermittent
    - Shortness of breath (dyspnea)
    - Cough

    - Palpitations
    - Muscle pain
    - Sore throat
    - Runny nose
    - Joint pain
    - Headache
    - Difficulties with cognition
        - Brain fog
    - Loss of taste or smell
    - Hair loss
    - Nausea
    - Diarrhea
    - Ear pain
    - Rash
    - Fevers
    - Chills or shivering
    - Post-exertional malaise
    - Sleep problems
- Persistent organ complications include:
    - Abnormal heart findings (Long, 2020)
        - Inflammation in the heart and muscle lining
        - Acute Myocardial Infarctions
        - Heart Failure
        - Arrhythmia
    - Pulmonary dysfunction
        - Acute respiratory distress
        - Reduced exercise tolerance
        - Pulmonary fibrosis
    - Brain and neurological issues (Ahmad, 2020)
        - Cerebrovascular accidents
        - Guillain-Barre syndrome
        - Acute encephalitis
        - Chronic fatigue syndrome
    - Endocrine
        - New or worsening control of existing Diabetes Mellitus
        - Thyroid dysfunction
        - Bone demineralization
    - Psychological
        - Posttraumatic stress disorder
        - Depression
        - Poor memory and concentration
        - Anxiety
        - Psychological impact on individual worker and their family
    - Worsening pre-existing conditions and disabilities

The fastest growing group of people with long term symptoms are those who initially had a mild infection and individuals with a constellation of symptoms without organ dysfunction are more difficult to diagnose and treat. Requiring multi-disciplinary evaluation and interventions directed at the post COVID-19 syndrome. Due to this growing need for specialized treatment, Post-Acute Care facilities are in 39 states across the United States (Choo, 2021).

Elements of high-quality clinics include (Choo, 2021):

- Access to a wide range of physician specialists such as:
    - Pulmonology, cardiology, integrative medicine, family medicine, behavioral health, critical care, and neurology
- Full complement of allied health professionals, such as:
    - Physical Therapy
    - Occupational therapy
    - Speech pathology
    - Pulmonary rehabilitation
- National Institute of Health (NIH) Research Initiative
- Peer support groups

Federal and State Response to COVID-19:
On January 30, 2020, the World Health Organization (WHO) declared the outbreak a public health emergency of international concern. On January 31, 2020, the Health and Human Services Secretary declared a public health emergency (PHE) for the United States to aid the nation in responding to COVID-19. The President of the United States signed a presidential Proclamation on Suspension of Entry as Immigrants and Nonimmigrants of Persons who Pose a Risk of Transmitting 2019 Novel Coronavirus on January 31, 2020. COVID-19 was characterized as a pandemic on March 11, 2020 by the World Health Organization (WHO). On March 13, the President of the United States declared the COVID-19 outbreak a national emergency (McIntosh, 2020a).

Initially, many states mandated the closure of schools as well as bars, restaurants and nonessential businesses. States also mandated the use of face coverings in public settings. Some states have since relaxed these mandates while others continue with closures and masks.

The Centers for Medicare & Medicaid Services (CMS) has loosened restrictions on criteria for transfers by relaxing the 3-day rule, which requires a Medicare beneficiary to spend 3 days in the hospital to qualify for the skilled nursing facility benefit. This will facilitate faster transfer for the least-sick patients ((CMS News Release, March 13, 2020; Grabowski & Maddox, 2020). The CMS has also expanded access to Medicare telehealth services through the **1135 Waiver**. Under this new waiver, Medicare can pay for office, hospital, and other visits furnished via telehealth across the country and including in patient's places of residence starting March 6, 2020. This results in increased access to care and helps to prevent the spread of the disease by eliminating in-person contact (CMS, March 17, 2020; Grabowski & Maddox, 2020).

State governments have enacted various rules around the use of proof-of-vaccination requirements, which require people to prove they have been vaccinated against COVID-19. Some states have banned proof-of-vaccination requirement through executive orders or legislation. While others have facilitated the creation of digital vaccination status applications, passed laws or enacted orders which exempt vaccinated individuals from COVID-19 restrictions or engage in activities unavailable to unvaccinated people. An up to date summary surrounding state proof-of-vaccination can be found at the following website:

- https://ballotpedia.org/State_government_policies_about_vaccine_requirements_(vaccine_passports)#State_proof-of-vaccination_policies

On February 9, 2023 the Secretary of Health and Human Services (HHS) renewed the Coronavirus Disease 2019 (COVID-19) public health emergency declaration issued under section 319 of the Public Health Service Act (PHS Act). The declaration is expected to expire at the end of the day on May 11, 2023. Many of the FDA guidance documents issued to address COVID-19 were tied to the duration of the

PHE. The FDA is revising several of the guidance documents to continue to be in effect for 180 days after the COVID-19 PHE declaration expires (FDA, 2023).

Vaccines and transplants:
The issue of transplant centers adopting COVID-19 vaccine mandates as a requirement for active transplant candidacy has been the subject of public controversy. Transplant centers in the United States exhibit various policies regarding pre-transplant COVID-19 vaccines. Most centers have not mandated COVID-19 vaccination for candidates and living donors. Centers opposed to vaccine mandate cite administrative opposition, legal prohibitions, and ethical concerns. All centers encourage vaccination. Vaccination is recommended prior to transplantation, ideally with completion of vaccine series a minimum of 2 weeks prior to transplant. Living donors are also encouraged to be vaccinated to minimize peri-operative risks. This is an evolving topic and is subject to change if professional transplant societies develop universal guidelines to address COVID-19 vaccine in the transplant population (AST/ASTS/ISHLT, 2021; Hippen, 2022).

[1]Literature Review:
Fumagalli et al (December 2021) investigated the factors associated with persistence of symptoms one year after COVID-19. The study evaluated 254 patients who completed a telephone follow-up program which monitored symptoms 1,3,6,9 and 12 months after hospital discharge. The survey screened for somatic (fatigue, dyspnea, dyspnea, palpitations, cough, chest pain, abdominal pain, ageusia, anosmia, bowel symptoms) and emotional symptoms (insomnia, confusion, altered sense of reality, loss of appetite, fear, and depression) and frailty. Approximately 40 % of patients reported at least one symptom present at 12 months post hospital discharge. The most common somatic symptoms were fatigue, exertional dyspnea, cough, bowel complaints while the most common psycho-emotional were insomnia, confusion, fear, and depression. Age, gender, frailty, multiple symptoms at baseline and chronic obstructive pulmonary disease (COPD) were associated with symptoms persistence [Strength of Evidence Rating - Medium].

Puntmann et al (November 2020) evaluated the overall impact of Coronavirus Disease 2019 (COVID-19) on the cardiovascular system. A total of 100 patients that were recently recovered from COVID-19 were included. Cardiovascular magnetic resonance (CMR) and cardiac blood markers were obtained and compared with age-matched and sex-matched control groups of healthy volunteers (n = 50) and risk factor–matched patients (n=57). Patients who had recently recovered from COVID-19 had lower left ventricular ejection fraction, higher left ventricle volumes, and raised native T1 and T2 compared with healthy controls and risk factor matched controls. The study found cardiac involvement with 78 patients and ongoing myocardial inflammation in 60 patients. These findings were independent of preexisting conditions, severity and overall course of the acute illness. The authors recommend future research on the long-term impact of COVID-19 on the cardiovascular system [Strength of Evidence Rating - Medium].

An outbreak of pneumonia associated with a novel coronavirus was reported in Wuhan city, Hubei province, China. Chan et al (January 2020) studied the familial cluster of pneumonia associated with the 2019 novel coronavirus. A family of six patients who travelled to Wuhan from Shenzhen between Dec 29, 2019 and Jan 4, 2020 was included in the study. Five of the family members were identified as infected with the novel coronavirus. Also, one family member who did not travel to Wuhan, became infected with the virus after several days of contact with four of the family members. Two of the family members had visited a Wuhan hospital, but none of the family had contact with Wuhan markets or animals. Five family members (aged 36-66) experienced fever, upper or lower respiratory tract symptoms, diarrhea, or a combination of these 3–6 days after exposure. A patient that was >60 years had more systemic symptoms, extensive radiological ground-glass lung changes, lymphopenia, thrombocytopenia, and

[1] Any literature relating to economic impact is for informational purposes and should not be considered when reviewing for medical necessity. Rating assignment criteria from ACOEM's strength of evidence rating methodology.

increased C-reactive protein and lactate dehydrogenase levels. The authors found that the findings are consistent with person-to-person transmission of this novel coronavirus in hospital and family settings [Strength of Evidence Rating - Medium].

Huang et al (January 2020) reported the epidemiological, clinical, laboratory, and radiological characteristics and treatment and clinical outcomes of patients with 2019 novel coronavirus (2019-nCoV). The study prospectively collected and analyzed data on 41 patients with laboratory-confirmed 2019-nCoV infection by real-time RT-PCR and next-generation sequencing. Most of the patients were men and less than half had underlying diseases. A total of 27 of the 41 patients had been exposed to Huanan seafood market. Common symptoms at onset of illness were fever, cough, and myalgia or fatigue; less common symptoms included sputum production, headache, hemoptysis, and diarrhea. All 41 patients had pneumonia with abnormal findings on chest CT. Complications included acute respiratory distress syndrome, acute cardiac injury and secondary infection. 13 patients were admitted to an intensive care unit and six patients died. The authors recommend additional research to identify the origin, epidemiology, duration of human transmission, and clinical spectrum of disease [Strength of Evidence Rating - Medium].

Guan et al (February 2020) studied the clinical characteristics of COVID-19. Data from 1099 patients with laboratory-confirmed Covid-19 from 552 hospitals in mainland China was analyzed. The median age of the patients was 47. Admission to an intensive care unit occurred in 5% of the patients, 2.3% who underwent invasive mechanical ventilation, and 1.4% who died. The most common symptoms were fever and cough. Fever was only present in 43.8% of patients upon admission but occurred in 88.7% of patients during hospitalizations. The median incubation period was 4 days. Ground-glass opacity was the most common radiologic finding on chest computed tomography on admission. Lymphocytopenia was common and present in 83.2% of the patients on admission. The data shows that COVID-19 has a wide spectrum of severity [Strength of Evidence Rating - Medium].

Shen et al (August 2020) evaluated the treatment of patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection with convalescent plasma transfusion. The study included 5 critically ill patients with laboratory-confirmed COVID-19 and acute respiratory distress syndrome (ARDS). All patients were treated with convalescent plasma transfusion between 10 and 22 days after admission. All 5 patients were previously treated with antiviral agents and steroids. Following plasma transfusion, the viral load declined within days. The clinical conditions of patients improved as evidenced by body temperature normalization, the SOFA score decreased, and PAO2/FIO2 increased within 12 days. ARDS resolved in 4 patients at 12 days after transfusion. The limited sample size and study design preclude a definitive statement about the potential effectiveness of this treatment. Additional clinical trials are required to evaluate the observations [Strength of Evidence Rating - Medium].

Gautret et al (March 2020) evaluated the effect of hydroxychloroquine on respiratory viral loads. A total of 26 inpatients received 600mg of hydroxychloroquine daily and their viral load in nasopharyngeal swabs was tested daily. Azithromycin was added depending on the clinical presentation. The control group were 16 patients who refused the hydroxychloroquine treatment. Those treated with hydroxychloroquine showed a significant reduction in the viral carriage at day 6 post inclusion in comparison to the control group. Those treated with hydroxychloroquine and azithromycin were 100% virologically cured compared with 57.1% of those treated with hydroxychloroquine alone. The study demonstrated that hydroxychloroquine (HCQ) was superior to standard treatment for the viral load clearance. However, the small sample size was a limitation to the study [Strength of Evidence Rating - Low].

Carsana et al (June 2020) analyzed the pathological features in the lung tissues of patients who have died with COVID-19. Lung tissue samples from 38 patients who died from COVID-19 in two hospitals in northern Italy between Feb 29 and March 24, 2020 were included in the study. The cases all showed features of the exudative and proliferative phases of diffuse alveolar damage, including: capillary

congestion (in all cases), necrosis of pneumocytes (in all cases), hyaline membranes (in 33 cases), interstitial and intra-alveolar edema (in 37 cases), type 2 pneumocyte hyperplasia (in all cases), squamous metaplasia with atypia (in 21 cases), and platelet–fibrin thrombi (in 33 cases). The diffuse alveolar damage is consistent with the description of patients that were infected with severe acute respiratory syndrome and Middle East respiratory syndrome coronaviruses. The presence of platelet-fibrin thrombi is consistent with coagulopathy. The authors state that the finding of diffuse thrombotic vascular involvement could be relevant in the management and targeted treatment of patients infected with COVID-19 [Strength of Evidence Rating - Medium].

Horby et al (July 2020) evaluated the use of dexamethasone in patients hospitalized with COVID-19. A total of 2104 patients were randomly assigned to receive 6 mg of oral or intravenous dexamethasone once daily for up to 10 days, while 4321 patients were assigned to receive usual care. 482 patients (22.9%) in the dexamethasone group and 1110 patients (25.7%) in the usual care group died within 28 days after randomization. The incidence of death among patients receiving invasive mechanical ventilation was 29.3% for those given dexamethasone, compared with 41.4% of those receiving usual care. The incidence of death was also lower among those receiving oxygen without invasive mechanical ventilation in the dexamethasone group than in the usual care group. However, there was no benefit among those who were receiving no respiratory support at randomization. The authors conclude that the use of dexamethasone resulted in lower 28-day mortality among those receiving either invasive mechanical ventilation or oxygen alone [Strength of Evidence Rating - Medium].

Spinner et al (September 2020) evaluated the effect of remdesivir compared with standard care on clinical status at 11 days in patients with moderate coronavirus disease 2019 COVID-19. A total of 96 patients were randomized to receive a 10-day course of remdesivir, a 5-day course of remdesivir, or standard care. Patients in the 5-day remdesivir group had statistically significantly higher odds of a better clinical status distribution than those receiving standard care on day 11. There was not a statistically significant difference in the clinical status distribution on day 11 between the 10-day remdesivir and standard care groups. The authors conclude that hospitalized patients with moderate COVID-19 randomized to a 5-day course of remdesivir had a statistically significantly better clinical status compared with those randomized to standard care at 11 days after initiation of treatment, but the difference was of uncertain clinical importance [Strength of Evidence Rating - Medium].

Taquet et al (April 2021) investigated the incidence of cerebral venous thrombosis (CVT) following COVID-19 diagnosis compared to influenza, or receipt of a COVID-19 vaccine. The incidence of CVT after COVID-19 diagnosis was 39.0 per million people which was higher than the CVT incidence after influenza (0.0 per million people) or after receiving BNT162b2 or mRNA 1273 vaccine (4.1 per million people). The incidence of portal vein thrombosis (PVT) was 436.4 per million people after COVID-19, 98.4 after influenza, and 44.9 after BNT162b2 or mRNA-1273. The data reveals that the incidence of CVT is significantly increased after COVID-19, and greater than that observed with BNT162b2 and mRNA-1273 COVID-19 vaccine [Strength of Evidence Rating - Medium].

Additional Links and Resources:

- The quarantine and isolation calculator may be used to determine the length of time needed isolate, quarantine or to continue preventative measures:
    - https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html

- The COVID-19 community levels are used to determine prevention steps. The levels can be low, medium, or high and are determined by looking at hospital beds being used, hospital admissions, and the total number of new COVID-19 cases in an area.

- https://www.cdc.gov/coronavirus/2019-ncov/your-health/covid-by-county.html

- Updated case counts can be found on the World Health Organization website:
  - https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

- Providers should refer to the Center for Disease Control and Prevention (CDC) website for updated information as needed.
  - https://www.cdc.gov/coronavirus/2019-ncov/index.html

- The Institute for Health Metrics and Evaluation (IHME) is providing COVID-19 projections for the United States and for the Individual States. These charts show projected hospital resource use as well as State-mandated social distancing information.
  - https://covid19.healthdata.org/projections

- Link to affected geographic areas can be found at:
  - https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/index.html

Care Setting

- Social distancing
  - Deliberately increasing the physical space between people to avoid spreading illness
  - Staying at least six feet away from others is recommended.
  - Avoid social gatherings in groups of more than 10 people
- Increased use of Telehealth Services for both routine care and care associated with COVID-19
- Self-isolation
  - If there is sufficient concern for COVID-19 or patient is diagnosed positive for COVID-19, self-isolation at home is recommended
  - Older people, anyone with long-term medical conditions and pregnant women may practice self-isolation to avoid exposure to COVID-19.
- If an individual tests positive, the decision to monitor, treat and isolate in the inpatient or outpatient setting should be made on a case-by-case basis
- Hospitalization for acute care is required for critically ill patients with COVID-19
  - Airborne precautions with protective equipment including eyewear and mask for health care workers should be used.
- Post-acute care may be required during recovery from infection (Grabowski & Maddox, 2020)
  - Post-acute care includes rehabilitation or palliative services following a stay in an acute care hospital.
  - Depending on the patient's needs, treatment may include a stay in a facility, such as a skilled nursing facility, inpatient rehabilitation facility, or long-term care hospital, or care in the home via a home health agency.
- Any patients that meet the criteria for patient under investigation for COVID-19 should be reported to the infection control personnel at their healthcare facility and their local or state health department

Related Guidelines

First Line

Sunset Clause

This guideline was developed in February 2020 and most recently updated January 20, 2022, March 7, 2022, May 5, 2022 , June 24, 2022, September 6, 2022, January 5, 2023, and March 23, 2023 in an evidence-based approach and formal consensus-based process. All Genex guidelines are assessed annually and undergo a comprehensive review at a minimum of every 2 years with updates as appropriate. This guideline is effective from April 1, 2022 to April 1, 2024.

NOTE: Information on this topic will be monitored on a continuous basis and this guideline will be reviewed and updated as necessary.

Diagnostic Confirmation: Coronavirus

Subjective Findings

- Report of
  - Recent travel to areas with sustained transmission within 14 days prior to symptom onset
    - Link to affected geographic areas can be found at: https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/index.html
  - Exposure to or close contact with a person with symptoms of COVID-19 or a person known to have COVID-19
  - Fever
  - Repeated shaking with chills
  - Dry cough
    - Coughing sputum or blood
  - Difficulty breathing (reports of shortness of breath)
  - Chest pain or pressure
  - Sore throat
  - Headache
  - Diarrhea
  - Nausea or vomiting
  - Abdominal pain
  - Fatigue

    - Anorexia
    - Myalgia
    - Rhinorrhea
    - Conjunctivitis
    - Anosmia and dysgeusia (loss of smell and taste)
    - Confusion
    - Nasal congestion
- Individuals may also be asymptomatic

Objective Findings

- Persistent cough
- Fever
- Dyspnea (shortness of breath)
- Headache
- Purulent or blood-tinged sputum
- Hypoxia
- Tachycardia
- Hypotension
- Cutaneous manifestations
    - Maculopapular/morbilliform, urticarial, and vesicular eruptions and transient livedo reticularis
- Reddish-purple nodules on the distal digits similar in appearance to pernio (chilblains), or “COVID toes"
- Potential Acute complications of COVID-19 (McIntosh, 2021b):
    - Acute respiratory distress syndrome (ARDS)
    - Pneumonia
    - Cardiac and cardiovascular complications
        - Arrhythmias
        - Myocardial injury
        - Heart failure
    - Shock
    - Venous thromboembolism (VTE), including extensive deep vein thrombosis (DVT) and pulmonary embolism (PE)
    - Encephalopathy
    - Seizures
    - Sepsis

Diagnostic Tests

- Viral tests
    - Real-time reverse-transcriptase polymerase chain reaction (RT-PCR) assay (ACOEM, 2021; CDC, 2021c; McIntosh, 2022):
        - Amplify viral particles to identify small amounts of the virus
        - The types of samples include:

        - Anterior Nares (Nasal) – takes a sample from just inside the nostrils
        - Mid-turbinate – takes a sample from further up inside the nose
        - Nasopharyngeal – takes a sample from deep inside the nose, reaching the back of the throat
        - Oropharyngeal – takes a sample from the middle part of the throat (pharynx) just beyond the mouth
        - Sputum should only be collected for patients with a productive cough
        - Uncertainty regarding the optimal type of upper respiratory tract specimen (Caliendo & Hanson, 2022)
            - Evidence suggests that nasopharyngeal and oropharyngeal samples are comparable during the first week of infection. Days 8-14 the nasopharyngeal sample becomes more sensitive (ACOEM, 2021)
    - Laboratory-confirmed COVID-19 cases are individuals with at least one respiratory specimen that tested positive for the virus that causes COVID-19 at a CDC laboratory
        - Presumptive positive cases are individuals with at least one respiratory specimen that tested positive for the virus that causes COVID-19 at a state or local laboratory
    - Retesting
        - If initial testing is negative, but the suspicion for COVID-19 remains and confirming presence of infection is needed for infection control, the test may be repeated (Caliendo & Hanson, 2022)
        - Repeat testing within 24 hours is not recommended
        - Due to the risk of false-negatives, the medical provider may presumptively treat those who test negative but the suspicion for COVID-19 remains high
        - Individuals may continue to test positive for some time after a positive test result.
            - Antigen tests may remain positive for a few weeks after the initial positive. NAATs up to 90 days.
            - Reinfections can occur within 90 days, which can make it hard to know if a positive test indicates a new infection.
            - Consult a healthcare provider regarding individual circumstances.
    - Influenza/SARS-CoV-2
        - Serves as a single test to diagnose infection caused by one of three viruses: SARS-CoV-2, influenza A, and influenza B
        - Over the counter (OTC) tests are available to differentiate and detect influenza A and B, and SARS-CoV-2
    - Labcorp VirSeq SARS-CoV-2 NGS Test
        - First COVID-19 test authorized for the identification and differentiation of lineages
        - Intended to be used when a health care provider decides that the results may help guide appropriate clinical care
- Antigen testing or Point of Care testing (ACOEM, 2021; FDA, 2021a; FDA, 2022a)
    - Immunoassays that detect the presence of specific viral proteins either on or within the virus
    - Recommended for the diagnosis of COVID-19

            - Testing should be performed under medical care
            - Due to the risk of false-negatives, the medical provider may presumptively treat those who test negative but the suspicion for COVID-19 remains high
        - Performed on nasopharyngeal or nasal swab specimens
        - Rapid-response testing that can deliver results within fifteen minutes
    - Saliva test (FDA, 2020b)
        - Saliva sample is collected in a sterile container and processed by a laboratory to detect if individual is infected with COVID-19
            - This diagnostic test does not require a separate nucleic acid extraction step
        - SalivaDirect received Emergency Use Authorization (EUA) approval on August 15, 2020
            - The test is being further validated for asymptomatic individuals through a program that tests players and staff from the National Basketball Association (NBA).
    - Home test kits (FDA, 2021; FDA, 2022a; HHS, 2022)
        - Two types of home COVID-19 tests available:
            - Home sample collection kits for COVID-19 testing have been available by prescription
            - Self-collected nasal swab sample from an individual 2 years of age or older which is then run by the patients, prescription is not needed
                - May be purchased over the counter and produce rapid results
        - Residential households in the U.S. can order one set of four free at-home tests:
            - https://special.usps.com/testkits
- Antibody testing (McIntosh, 2022)
    - Serologic tests to detect antibodies to SARS-CoV-2 in the blood may help identify patients who have been infected with COVID-19
    - Several serologic tests have been granted emergency use authorization by the FDA
    - Should not be used as a sole test to diagnose or exclude active SARS-CoV-2 infection
    - Detectable antibodies may take several days to weeks to develop
- Diagnostic bronchoscopy with bronchoalveolar lavage (BAL)
- Laboratory (CDC, 2021c):
    - CBC with differential
    - Other blood tests that may be ordered:
        - Erythrocyte sedimentation rate (ESR) rate
        - C-reactive protein
        - Serum sodium
        - Serum BUN and creatinine
        - Serum transaminase levels
        - Serum phosphorous levels
        - Lactic acid
        - Lactate dehydrogenase (LDH)
        - Creatinine phosphokinase (CPK)
        - Coagulation testing
            - Prothrombin time and aPTT
            - Fibrinogen
        - D-dimer

    - Respiratory specimens (Caliendo & Hanson, 2022)
        - Analysis of additional respiratory pathogens should be done as part of the initial evaluation
            - Influenza
            - Respiratory syncytial virus (RSV)
        - Detection of another virus or bacterial pathogen does not rule out SARS-CoV-2
- Imaging
    - The optimal pulmonary imaging technique for symptomatic individuals has not been determined (NIH, 2022)
    - Chest CT (ACR, 2020; CDC, 2020h; Cennimo, 2022a):
        - Images have shown bilateral involvement in most patients.
        - Multiple areas of consolidation and ground glass opacities are typical findings
        - CT should not be used to screen for or as a first-line test to diagnose COVID-19
        - The American College of Radiology recommends that CT should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT
    - Chest X-ray (Cennimo, 2022a; Reed, 2022)
        - May demonstrate findings consistent with pneumonia
        - Should not be used as stand-alone screening tool
- Electrocardiogram (NIH, 2022)
- Long-term symptoms may require additional testing (Mikkelsen & Abramoff, 2021; NICE, 2021a):
    - Chest imaging (CXR, CT, HRCT, CT-pulmonary angiography)
    - Cardiac testing (EKG, transthoracic echocardiography)
    - Pulmonary function testing
    - Electrodiagnostic testing

Differential Diagnosis

- Community-Acquired Pneumonia (see Pneumonia, Community-Acquired guideline)
- Viral upper respiratory tract infection (URI)
- Acute allergic or cryptogenic alveolitis
- Acute bronchitis (see Bronchitis guideline)
- Emphysema or chronic bronchitis (see Chronic Obstructive Pulmonary Disease guideline)
- Pleurisy
- Chemical/aspiration pneumonia
- Gastritis
- Influenza
- Other pulmonary disease/disorder:
    - Embolism (see Pulmonary Embolism, Infarction guideline)
    - Edema
    - Eosinophilia
    - Tuberculosis
    - Primary or metastatic lung cancer
    - Pulmonary fibrosis

- Long COVID or PASC
    - Sleep disorders
    - Endocrine disorders
    - Lyme disease
    - Malaria

Treatment: Coronavirus

Treatment Goals

- Establish definitive diagnosis
- Identify appropriate treatment setting (inpatient or outpatient)
- Maintain optimal functional and physical condition, independence in activities of daily living (ADLs) and quality of life (QoL)
- Optimize tissue oxygenation deficit
- Aggressive pulmonary toilet to mobilize secretions, prevent atelectasis
- Hemodynamic monitoring and support as necessary for sepsis, resultant R-sided cardiac symptoms, any other co-morbid conditions
- Assess vaccination status and encourage appropriate vaccinations
- Nutritional support
- Contain virus and limit spread

Treatment Options

Providers should refer to the Center for Disease Control and Prevention (CDC) website for updated information as needed.

- https://www.cdc.gov/coronavirus/2019-ncov/index.html

- Isolated
    - Individuals suspected of COVID-19 infection should be immediately isolated and given mask
    - Hospitalized patients should be treated in a negative pressure hospital room if available
    - Infection control measures against airborne, contact, and eye exposure.
    - Notify public health department
    - The decision to monitor a patient in the inpatient or outpatient setting should be made on a case-by-case basis. Dependent upon (CDC, 2021c):

        - Clinical presentation
        - The patient's ability to engage in monitoring and the risk of transmission in the patient's home environment
- FDA Approved Treatment
    - Remdesivir received approval from the U.S. Food and Drug Administration (FDA) on October 22, 2020 and updated on January 21, 2022
        - Indicated in individuals 12 years of age and older weighing at least 40 kg or 88 pounds with positive results of direct severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral testing, who are
            - Hospitalized OR
            - Not hospitalized and have mild-to-moderate COVID-19, and are at high risk for progression to severe COVID-19 including hospitalization or death
        - Remdesivir is the first treatment approved for COVID-19
    - Olumiant (baricitinib) is approved for the treatment of COVID-19 in hospitalized adults requiring supplemental oxygen, non-invasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation (ECMO).
- Investigational agents that have received Emergency Use Authorization (EUA) for the treatment of COVID-19 includes but are not limited to the following (ACOEM, 2021; IDSA, 2022; Kim & Gandhi, 2021; McIntosh, 2022):
    - Emergency use authorization (EUA) programs allowed for rapid deployment of potential therapies for investigation and investigational therapies with emerging evidence
    - Monoclonal antibody (Cohen, 2022; McIntosh, 2022)
        - EUA for Evusheld (tixagevimab co-packaged with cilgavimab and administered together) for the pre-exposure prophylaxis (prevention) of COVID-19 in individuals 12 years or older (weighing at least 40 kg or 88 pounds)
            - Only indicated in individuals who are not currently infected with the SARS-CoV-2 virus and who have not recently been exposed to an individual infected with SARS-CoV-2. The authorization also requires that individuals either have:
                - Moderate to severely compromised immune systems Have a moderate to severe immunocompromising condition that may result in a suboptimal immune response to vaccination OR
                - Cannot receive a recommended series of a COVID-19 vaccine because of a severe adverse reaction to the vaccines or their components
            - A consult to an allergist-immunologist should be considered prior to administering Evusheld to individuals with a history of a severe allergic reaction (e.g., anaphylaxis) to a COVID-19 vaccine due to hypersensitivity reactions and the risk of cross-hypersensitivity with COVID-19 vaccines
        - Post-exposure prophylaxis (prevention) for COVID-19 in individuals who are at high risk for progression to severe COVID-19, including hospitalization or death, The following combinations have received an EUA:
            - Casirivimab-imdevimab (REGEN-COV)
                - Approved for in adults and pediatric individuals (12 years of age and older weighing at least 40 kg or 88 pounds)
            - Bamlanivimab and etesevimab
                - Approved for all high-risk groups, including children and newborn babies
            - Not authorized for pre-exposure prophylaxis to prevent COVID-19 before being exposed to the SARS-CoV-2 virus

        - Combination bamlanivimab-etesevimab, and combination casirivimab-imdevimab for treating patients who have tested positive for SARS-CoV-2 infection and who are considered to be at high risk for progression to severe COVID-19.
            - Risk factors include:
                - Body mass index (BMI) ≥35 kg/m²
                - Chronic kidney disease
                - Diabetes mellitus
                - Immunosuppression (immunosuppressive disease or treatment)
                - ≥65 years of age
                - ≥55 years of age and who have cardiovascular disease, and/or hypertension, and/or chronic obstructive pulmonary disease (or other chronic respiratory disease)
                - Not indicated in patients who are hospitalized or who require oxygen therapy because of COVID-19.
            - Administered as a 1-hour infusion followed by a 1-hour observation period for detecting any infusion-related side effects.
                - Subcutaneous administration is an alternative route for casirivimab-imdevimab when intravenous infusion is not feasible and would lead to delay in treatment
            - Note: The FDA has revoked the EUA for bamlanivimab, when used alone, for the treatment of mild to moderate COVID-19 due to ongoing research which revealed increased risk of treatment failure.
                - The EUA for combination bamlanivimab-etesevimab is still available
        - Tocilizumab
            - Treatment of hospitalized adults and children 2 years of age and older who are receiving systemic corticosteroids and require supplemental oxygen, non-invasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation
    - Antivirals
        - Lagevrio (Molnupiravir)
            - EUA for the treatment of mild-to-moderate coronavirus disease (COVID-19) in adults with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death, and for whom alternative COVID-19 treatment options authorized by the FDA are not accessible or clinically appropriate
        - Paxlovid (nirmatrelvir tablets and ritonavir tablets, co-packaged for oral use)
            - EUA for the treatment of mild-to-moderate coronavirus disease (COVID-19) in adults and pediatric patients (12 years of age and older weighing at least 40 kilograms or about 88 pounds) with positive results of direct SARS-CoV-2 testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death.
    - Tocilizumab
        - EUA for hospitalized adults and pediatric patients (aged 2 years and older) with COVID-19 who are receiving systemic corticosteroids and require supplemental oxygen, noninvasive or invasive mechanical ventilation, or extracorporeal membrane oxygenation
    - Blood related therapies
        - Convalescent plasma (FDA, 2021c; Kim & Gandhi, 2021):
            - Convalescent plasma obtained from individuals who have recovered from the virus and is given to patients with COVID-19 infection
            - The FDA issued an EUA for convalescent plasma on August 23, 2020.

        - February 4, 2021 the EUA was updated to Limit the authorization to the use of high titer COVID-19 convalescent plasma only for the treatment of hospitalized patients with COVID-19 early in the disease course and to those hospitalized patients who have impaired humoral immunity and cannot produce an adequate antibody response.
    - Access to medication may be obtained through:
        - Clinical trials
        - Expanded access
        - Single Patient Emergency Investigational New Drug (IND)
  - Hyperimmune globulin
  - Both treatment options use antibody-rich blood products made from blood donated by people who have recovered from the virus
- Treatments that are under investigation for COVID-19 but do not have EUA or FDA approval include:
    - Chloroquine/hydroxychloroquine
        - On June 15, 2020, the FDA revoked the Emergency Use Authorization (EUA) for chloroquine and hydroxychloroquine which allowed use of the medications to treat hospitalized patients diagnosed with COVID-19 when a clinical trial was not available or feasible.
            - According to the FDA, the known and potential benefits of the chloroquine and hydroxychloroquine no longer outweigh the known and potential risks (FDA, 2020a)
        - Hydroxychloroquine is not recommended for pre-exposure or postexposure prophylaxis or for treatment per the IDSA (IDSA, 2022; ODG by MCG, 2021a)
        - The potential adverse effects include but are not limited to (Kim & Gandhi, 2021):
            - Prolonged QT interval; avoid use in patients with prolonged QTc interval
            - Retinopathy
            - Cardiomyopathy
    - Sotrovimab
        - Sotrovimab is no longer authorized to treat COVID-19 in any U.S. region due to increases in the proportion of COVID-19 cases caused by the omicron BA.2 sub-variant
            - The authorized dose of sotrovimab is unlikely to be effective against the BA.2 sub-variant
    - Baricitinib alone
    - AT-527
    - Nitazoxanide
    - Niclosamide
    - Lopinavir-ritonavir
    - Favipiravir
    - Interleukin (IL)-6 receptor inhibitor
        - Sarilumab
        - Siltuximab
    - Interleukin-1 inhibitors
    - Interleukin-7 inhibitors
    - Colony-stimulating factors
    - Neurokinin-1 (NK-1) receptor antagonists
    - Mesenchymal stem cells
    - Phosphodiesterase inhibitors
    - Bucillamine
    - Tofacitinib

    - Famotidine
    - Interferon beta-1b
    - Vitamin D
    - Ivermectin
    - Colchicine
    - Fluvoxamine
    - Thapsigargin
    - Leronlimab
    - Nitric Oxide
    - Statins
    - Azithromycin
    - Bebtelovimab
        - Not currently authorized for emergency use because it is not expected to neutralize Omicron subvariants BQ.1 and BQ.1.1
    - A registry of international clinical trials can be found at www.clinicaltrials.gov
- Supportive therapy
    - Rest
    - Hydration
        - IV or oral hydration
    - Mucolytic agents
    - Cough suppressants
    - Analgesics
    - Anti-pyretic for fever control
    - Oxygen may be administered if the individual becomes hypoxic
    - Mechanical ventilation
    - Nutritional support
    - Smoking cessation, to improve prognosis
    - Corticosteroids (IDSA, 2022; NIH, 2022)
        - Dexamethasone is recommended for:
            - Patients with severe illness, defined as patients with SpO2 ≤94% on room air, and those who require supplemental oxygen, mechanical ventilation, or ECMO.
            - Hospitalized patients who are mechanically ventilated or require supplemental oxygen
                - A study by Horby et al (2020) found that the use of dexamethasone resulted in lower 28-day mortality among those receiving either invasive mechanical ventilation or oxygen alone.
        - Dexamethasone is not recommended in those that that do not require supplemental oxygen
    - Venous thromboembolism (VTE) prophylaxis (ACOEM, 2021; Anesi, 2021; Cuker & Peyvandi, 2021)
        - Routine VTE prophylaxis for hospitalized patients
            - Low molecular weight heparin
            - Additional mechanical device may be used on an individualized basis
        - A hypercoagulable state is associated with COVID-19
            - Fibrinogen and D-dimer are increased, with typically only modest prolongation of the prothrombin time (PT) and activated partial thromboplastin time (aPTT) and mild thrombocytosis or thrombocytopenia
            - Risk of VTE is markedly increased, especially in patients in the intensive care unit

            - Risk of other thrombotic events such as stroke or microvascular thrombosis is less clear
            - A retrospective study by Grillet et al (2020) found that 23 out of 100 patients with COVID-19 suffered an acute pulmonary embolism at a mean of 12 days from symptom onset. These patients were more likely to require care in the critical care unit and mechanical ventilation than those without pulmonary embolus.
    - Antibiotics may be prescribed empirically for secondary bacterial pneumonia, but continued use should be based on subsequent bacterial culture and sensitivity (ODG by MCG, 2021a)
- Quarantine and Isolation (CDC, 2022c; McIntosh, 2022)
    - Those who were exposed to COVID-19 and are NOT up to date on COVID-19 vaccinations should quarantine for at least 5 full days
        - Get tested at least 5 days after the last day of exposure
            - If test is positive then individual should isolate
            - If unable to get a test 5 days after last close contact with someone with COVID-19, individual may leave the home after day 5 if without COVID-19 symptoms throughout the 5-day period
        - Watch for symptoms until 10 days after the last close contact with someone with COVID-19
            - Wear a well-fitted mast for 10 full days around others inside the home or in public
            - Avoid travel
            - Avoid being around those who are at high risk
        - If symptoms develop, immediately isolate and get tested
    - Those who were exposed to COVID-19 and are up-to-date with vaccination OR had confirmed COVID-19 within the past 90 days
        - Do not need to quarantine unless symptoms develop
            - If symptoms develop, immediately isolate and get tested
        - Get tested at least 5 days after the last close contact with someone with COVID-19
        - Take precautions until 10 days after the last close contact with someone with COVID-19
            - Wear a well-fitted mast for 10 full days around others inside the home or in public
            - Avoid travel
            - Avoid being around those who are at high risk
            - Monitor for symptoms
    - If there is sufficient concern for COVID-19 or patient is diagnosed positive for COVID-19, self-isolation at home is recommended for at least 5 full days
        - Ending isolation if symptoms are present; after 5 full days if fever-free for 24 hours (without the use of fever-reducing medication) and symptoms are improving
            - If an individual has access to a test and wants to test, the best approach is to use an antigen test towards the end of the 5-day isolation period.
                - Collect the test sample only if fever-free for 24 hours without the use of fever-reducing medication and other symptoms have improved

            - Loss of taste and smell may persist for weeks or months after recovery and need not delay the end of isolation
        - If your test result is positive, you should continue to isolate until day 10.
        - If your test result is negative, you can end isolation, but continue to wear a well-fitting mask around others at home and in public until day 10.
    - Those who were asymptomatic may end isolation after 5 full days after the positive test
        - If an individual has access to a test and wants to test, the best approach is to use an antigen test towards the end of the 5-day isolation period.
            - If your test result is positive, you should continue to isolate until day 10.
            - If your test result is negative, you can end isolation, but continue to wear a well-fitting mask around others at home and in public until day 10.
    - Those who were severely ill with COVID-19 and those with a weakened immune system may need to isolate longer and may require testing with a viral test to determine to end isolation
        - Consult with the healthcare provider
    - All individuals who test positive for COVID-19 should take precautions until day 10
        - Wear a well-fitted mast for 10 full days around others inside the home or in public
        - Avoid travel
        - Avoid being around those who are at high risk
- Ongoing symptomatic COVID-19 or post-COVID-19 syndrome management (NICE, 2021a):
    - Multidisciplinary rehabilitation services to guide management.
    - Include physical, psychological and psychiatric aspects of rehabilitation.
    - Individualized rehabilitation and management plan should include:
        - Areas of rehabilitation and interventions based on their assessment
        - Symptom management for all presenting symptoms, for example advice and education on managing breathlessness, fatigue and 'brain fog'.
            - PASC related fatigue (AAPM&R, 2021a)
                - Energy conservation strategies, Four Ps":
                    - Pacing - activity to reasonable, and often shorter, durations (or alternatively, giving more time to complete activities to avoid rushing) and including scheduled rest breaks with activities
                    - Prioritizing - focus and decide on which activities need to get done on specific days and which activities can be postponed (or are unnecessary to do at all) to avoid overexertion and crashing.
                    - Positioning - modifying activities to make them easier to perform
                    - Planning - plan the day or week to avoid overexertion and to recognize energy windows
                - Healthy diet and hydration

        - Treat underlying medical conditions, such as pain, insomnia/sleep disorders (including poor sleep hygiene), and mood issues that may be contributing to fatigue.
    - Encourage people to keep a record of, or use a tracking app to monitor, their goals, recovery and any changes in their symptoms

- **Prevention** (McIntosh, 2020a; WHO, 2021a)
    - Vaccine
        - Everyone 6 months of age and older is eligible to receive a COVID-19 vaccination
            - Visit https://vaccinefinder.org/ or state health department website to find a vaccination provider
            - See the CDC's website for most current vaccine recommendations:
                - https://www.cdc.gov/coronavirus/2019-ncov/vaccines/stay-up-to-date.html
        - Currently four vaccines are available (Cennimo, 2022a; FDA, 2022b).
            - See Description section for details on parameters
            - Messenger RNA vaccines
                - Pfizer-BioNTech (30 µg, 0.3 ml each): Two doses given 3 weeks (21 days) apart
                - Moderna (100 µg, 0.5 ml): Two doses given 1 month (28 days) apart
                - An additional dose of mRNA COVID-19 vaccine after the initial 2 doses is recommended and approved for individuals who are moderately to severely immunocompromised.
                    - Third dose should be administered at least 28 days after the second dose of Pfizer-BioNTech or Moderna COVID-19 vaccine
                    - The third dose of the same mRNA vaccine should be used
            - Janssen/Johnson and Johnson COVID-19 Vaccine
                - Approved for those 18 years of age and older as a single injection
                - Women younger than 50 should be aware of the rare risk of blood clots with low platelets after vaccination
                - The CDC has updated its recommendations for COVID-19 vaccines with a preference for people to receive an mRNA COVID-19 vaccine (Pfizer-BioNTech and Moderna) over the Janssen/Johnson and Johnson COVID-19 vaccine
                    - Due to the risk of thrombosis with thrombocytopenia syndrome (TTS) from the Johnson and Johnson vaccine
            - Novavax- 2 doses in the primary series, given 3–8 weeks apart.
                - Approved for ages 18 and older
                - Not authorized for use as a booster dose at this time.
            - Booster dose (CDC, 2022e; CDC, 2022f; Edwards & Orenstein, 2022)
                - A preference for people to receive an mRNA COVID-19 vaccine (Pfizer-BioNTech and Moderna) over the Janssen/Johnson and Johnson COVID-19 vaccine
                - A second booster with Pfizer-BioNTech or Moderna is available if it has been at least 4 months since the first booster dose AND the individual is 50 years or older OR at least age 12 years of age with certain kinds of immunocompromise

        - For the most current CDC COVID-19 vaccine booster recommendations see:
            - https://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html
- Contraindications and precautions
    - Contraindications to the vaccines include:
        - A severe allergic reaction after a previous dose of the vaccine
            - An allergic reaction is considered severe when a person needs to be treated with epinephrine or EpiPen© or if the person must be hospitalized
        - An immediate reaction, within four hours of receiving an mRNA COVID-19 vaccine, even if it is not severe enough to require emergency care
            - Patients who experience a severe or an immediate allergic reaction of any severity, or who have questions related to risk of an allergic reaction, may be referred to an allergist or immunologist (ACAAI, 2021a)
        - A severe allergic reaction to any ingredient in the vaccine
            - Those with allergies to a vaccine ingredient should consult with physician to determine if another type of COVID-19 vaccine is appropriate
        - Myocarditis after a dose of mRNA COVID 19 vaccine is not an absolute contraindication:
            - Recommend deferral of a subsequent dose
            - People who choose to receive a subsequent dose should wait until myocarditis has completely resolved
    - Those with precautions to COVID-19 should consult their physicians to determine if they should receive a COVID-19 vaccine. Precautions include:
        - A history of an immediate reaction to a vaccine injectable therapy, not related to a component of mRNA vaccines or polysorbate
    - Patients who have had COVID-19 and received monoclonal antibodies or convalescent serum to treat COVID-19 should wait 90 days before getting the vaccine
    - Individuals being treated for cancer should discuss with their oncologist the timing of the vaccine
    - Co-morbid medical conditions
        - People with underlying medical conditions can receive a COVID-19 vaccine as long as they have not had an immediate or severe allergic reaction to a COVID-19 vaccine or to any of the ingredients in the vaccine.
            - Those with concerns regarding COVID-19 vaccination should discuss with their medical provider their best vaccine option
        - Individuals with a history of Guillain-Barré syndrome (GBS) may receive any currently FDA-approved or FDA-authorized COVID-19 vaccine.

        - Due to the possible association between the Janssen COVID-19 vaccine and an increased risk of GBS, a patient with a history of GBS may receive an mRNA COVID-19 vaccines as an alternative to the Janssen COVID-19 vaccine
    - Vaccinated persons may resume activities without wearing masks or physically distancing, except where required by federal, state, local, tribal, or territorial laws, rules and regulations, including local business and workplace guidance (CDC, 2022f)
        - Masks should be worn in areas of substantial or high transmission
    - Additional vaccines are being developed, including nucleic acid-based (mRNA and DNA) vaccines, viral-vector vaccines, and inactivated or recombinant protein vaccines (McIntosh, 2020a)
        - A catalog of candidate vaccines and their stages of development can be found at: covid-trials.org
    - Efforts are underway to prepare a vaccine for the prevention of SARS and MERS (McIntosh, 2021; McIntosh, 2020c)
- Travel
    - Traveling within the United States
        - Multiple states have travel restrictions in place
            - For state specific restrictions, check the state or local health department along the travel route
        - Do not travel if testing is positive for COVID-19
        - Delay travel after a known exposure to COVID-19
    - Traveling from international countries to the United States (CDC, 2022n)
        - CDC recommends that travelers avoid all nonessential travel and only travel internationally if fully vaccinated
        - Recommendations for international travel (CDC, 2022n)
            - Check destination's testing requirements prior to departure, they may require specific tests
        - Recommended that those boarding a flight to the U.S. get tested for current infection with a viral test as close to the time of departure as possible (no more than 3 days) and not travel if they are sick
        - Noncitizens who are nonimmigrants, traveling to the United States by air from any part of the world must establish that they are fully vaccinated
    - Always follow federal, state and local recommendations or requirements related to travel.
- Infection prevention
    - Patients who do not need emergent care should be instructed to call prior to presenting to a health care facility for evaluation
        - The need for testing may be evaluated over the phone
    - Individuals who are sick should wear a facemask (McIntosh, 2022)
        - When around other people and before entering a healthcare providers office
        - If individual is unable to wear a facemask, the caregiver should wear a mask when entering the room
    - Cloth face coverings (CDC, 2021g; McIntosh, 2022):
        - CDC recommends wearing cloth face coverings, such as homemade masks or bandanas, or disposable masks in public settings
        - Masks are no longer required on public transportation conveyances or transportation hubs in the United States

        - The CDC continues to recommend the use of masks in indoor public transportation settings
    - Many states have mandated the use of face coverings in public settings
        - Check both state and local health department for specific requirements
    - Cloth face coverings should:
        - Fit snugly but comfortably against face
        - Secured with ties or ear loops
        - Include multiple layers of fabric
            - Two ways to layer:
                - Use a mask with multiple layers of fabric
                - Wear one disposable mask underneath a cloth mask; the second masks should push the edges of the inner mask against your face
                - Do not combine two disposable masks or combine a KN95 with another mask
        - Choose a mask with a nose wire
        - Allow for breathing
        - Be able to be laundered and machine dried without damage or change to shape
            - Face covering should be laundered routinely (McIntosh, 2022)
    - Avoid touching the mask while using it; if you do, clean your hands with alcohol-based hand rub or soap and water
    - Removal
        - Wash hands or use alcohol-based hand sanitizer prior to removing mask
        - Carefully untie (or unhook from the ears) and pull away from face without touching the front
        - Do not touch the front of the mask or face while removing
        - Perform hand hygiene after removal
    - Care of reusable face coverings (CDC, 2021e; Johns Hopkins, 2020a)
        - Face covering should be cleaned after every wear to reduce the spread of germs
        - Face covering can be washed in regular laundry using hot water
        - Wash by hand:
            - Wash with tap water and laundry detergent or soap (CDC, 2021e)
        - Tumble dry in dryer on a high setting or hang to dry in direct sunlight
        - Store in a clean place while not in use
    - Face coverings do not replace other preventative measures such as social distancing and hand hygiene
- Handwashing
    - Frequent hand washing with soap and water
    - Use of alcohol-based sanitizers
    - Several antiseptic/disinfectant solutions used commonly in hospitals and households, including chloroxylenol, benzalkonium chloride, and cetrimide/chlorhexidine, have been shown to be ineffective against coronaviruses
- Avoid touching your eyes, nose, and mouth with unwashed hands
- Stay home when you are sick.

        - Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
        - Physical and social distancing
            - Avoid crowded gatherings
            - Avoid close contact with people who are sick.
            - Avoid eating or drinking at bars, restaurants and food courts
                - The use of drive-thru, pickup or delivery is recommended
            - Avoid discretionary travel including social trips and shopping
        - Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe.
            - See the EPA's recommendations on Disinfectants for Use Against SARS-CoV-2:
                - https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2
        - When visiting live markets in areas currently experiencing cases of coronavirus, avoid direct unprotected contact with live animals and surfaces in contact with animals
        - The consumption of raw or under-cooked animal products should be avoided. Raw meat, milk or animal organs should be handled with care, to avoid cross-contamination with uncooked foods, as per good food safety practices.
        - Healthcare workers prevention
            - See the CDCs guideline on Use Personal Protective Equipment (PPE) When Caring for Patients with Confirmed or Suspected COVID-19. At https://www.cdc.gov/coronavirus/2019-ncov/downloads/A_FS_HCP_COVID19_PPE.pdf
            - Facilities implementing reuse or extended use of PPE will need to adjust their donning and doffing procedures to accommodate those practices
            - Gloves, masks, and other waste generated during patient care should be placed into a waste bin with a lid in the patient's room before disposing of it as infectious waste

- **Reopening America**
    - Businesses and individuals should continue to implement strategies to reduce the risk of exposure to COVID-19 while reopening:
        - Social distancing
        - Cleaning and disinfecting of surfaces
        - Personal protective equipment and hand hygiene
        - Face coverings while in public
            - Provide workers with face coverings or surgical masks as appropriate
        - Stay home if feeling ill or following travel to an area with a Covid-19 surge
            - For state specific restrictions, check the state or local health department along the travel route
            - Anyone who has close contact with someone with COVID-19 should stay home for 14 days after exposure
    - Additional workplace and business prevention measures (OSHA, 2021):
        - Temperature checks
        - Disinfect common and high-traffic areas
        - Limit business travel
        - Facilitate employees getting vaccinated against COVID-19
        - Implement physical distancing

- Educate and train employees on COVID-19 policies and procedures
- Additional measures:
    - The Tiger Tech COVID PlusTM Monitor (Brooks, 2021)
        - Intended to help prevent spread of SARS-CoV-2 by identifying certain biomarkers in asymptomatic individuals over the age of 5, when performed following a temperature reading that does not meet the criteria for fever in settings where temperature check is being conduct
        - An armband with two embedded sensors and a processor that is to be worn around the bare left arm above the elbow for 3-5 minutes.
        - At the end of the measurement, the LED light will glow solid green, red, or blue.
        - NOT a diagnostic device and must not be used to diagnose or exclude SARS-CoV-2 infection.

Centers for Disease Control (CDC) Interim Guidance

The CDC offers information for a variety of specific groups. Interim guidance information provided by the CDC is based on what is currently known about the transmission and severity of coronavirus disease 2019 (COVID-19).

- Please check the following CDC websites periodically for updated interim guidance information.
- These and other interim guides can be found at: https://www.cdc.gov/coronavirus/2019-ncov/index.html

Interim Public Health Recommendations for Fully Vaccinated People. Updated January 5, 2021: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html

Evaluating and Caring for Patients with Post-COVID Conditions: Interim Guidance. Updated June 14, 2021: https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/post-covid-index.html

Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 (COVID-19) Pandemic. Updated September 10, 2021: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-after-vaccination.html

COVID-19 Vaccines Booster Shots, Updated January 7, 2022 https://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html

Interim Guidelines for COVID-19 Antibody Testing. Last Reviewed September 21, 2021: https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html

Interim Guidance for Airlines and Airline Crew: Coronavirus Disease 2019 (COVID-19). Updated May 25, 2021: https://www.cdc.gov/quarantine/air/managing-sick-travelers/ncov-airlines.html

Guidance for Institutions of Higher Education (IHE). Updated December 29, 2021 https://www.cdc.gov/coronavirus/2019-ncov/community/colleges-universities/considerations.html

Healthcare Professionals:

Interim Guidance for Healthcare Facilities: Preparing for Community Transmission of COVID-19 in the United States. Updated February 8, 2021: https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/guidance-hcf.html?deliveryName=USCDC_2067-DM21103

Use Personal Protective Equipment (PPE) When Caring for Patients with Confirmed or Suspected COVID-19. Updated June 3, 2020: https://www.cdc.gov/coronavirus/2019-ncov/downloads/A_FS_HCP_COVID19_PPE.pdf

Duration of Medical Treatment

- Medical -
    - The following precautions should be taken for those exposed to a person with either suspected or documented COVID
        - Masks should be worn as soon as aware of exposure and continued for 10 full days
        - Avoid travel
        - Avoid being around those who are at high risk
        - Monitor for symptoms:
            - Fever
            - Cough
            - Shortness of breath
        - Isolate immediately and test if symptoms develop
        - Get tested at least 5 days after the last exposure
            - Continue to wear a mask until day 10 if negative
            - Isolate immediately if test is positive
    - If patient is diagnosed positive for COVID-19, self-isolation at home is recommended for at least 5 full days
        - All individuals who test positive for COVID-19 should take precautions until day 10
            - Wear a well-fitted mast for 10 full days around others inside the home or in public
            - Avoid travel
            - Avoid being around those who are at high risk
    - Ongoing shedding of virus requiring isolate precautions
    - Overall treatment duration varies depending on the individual patient, level of disability, severity of injury, treatment plan and presence of disability red flags.
        - Information on long-term effects of COVID-19 is emerging
            - Medical care may be required for an indefinite period of time.

Provider Information

Primary Care Physician Office Visit Schedule

- Initial visit;
- Follow-up
    - Uncomplicated: weekly for 2-3 weeks; then, as needed

- Complicated: weekly for 2-4 weeks, then as needed

Referral Options

- Emergency medicine
- Infectious disease specialist
- Pulmonologist
  - If O2 therapy, mechanical ventilation, co-morbid pulmonary disease
- Report to Centers for Disease Control
- Report to Local State Health Department Infectious Disease Agencies
- Allergist/Immunologist
  - Patients with an allergy to an ingredient in a COVID-19 vaccine should consult with allergist to determine if they may receive another type of COVID-19 vaccine.
  - Patients who experience a severe or an immediate allergic reaction of any severity, or who have questions related to risk of an allergic reaction, may be referred to an allergist or immunologist (ACAAI, 2021a)
  - A consult to an allergist-immunologist should be considered prior to administering Evusheld to individuals with a history of a severe allergic reaction (e.g., anaphylaxis) to a COVID-19 vaccine due to hypersensitivity reactions and the risk of cross-hypersensitivity with COVID-19 vaccines
- Long term symptoms may require referral to:
  - Cardiologist
  - Pulmonologist
  - Hematologist
  - Neurologist
  - Psychiatrist
  - Physiatrist
  - Speech pathologist
  - Pulmonary Rehabilitation

Specialist Office Visit Schedule

- Early consultation with an infectious disease specialist, infection prevention and control services, and reference laboratories is critical
- Initial evaluation; follow-up, as indicated

Physical Medicine

Frequency and Duration of Physical Medicine Treatment

- PT may be needed secondary to generalized weakness in recovering patient.
- Appropriate training in home exercise program should begin once clinically indicated
- Interdisciplinary Post-Acute Care Rehabilitation may be needed for those with long-term complications, such as:
  - Physical Therapy
  - Occupational therapy
  - Speech pathology
  - Pulmonary rehabilitation

Modalities:

- These are examples of modalities which may be applied in the course of physical therapy treatment. Every modality is not appropriate for every condition.

Durable Medical Equipment and Supplies

- Specialty respiratory support items which may be necessary for home care:
    - Oxygen
        - Portable small or large tank(s)
        - Stationary tank
        - Liquid oxygen if using large amounts of O2
    - Concentrator
    - Nebulizer
    - Ventilator
    - Electrical adaptors
    - Generator for emergency back-up

Disability: Coronavirus

Red Flags or Conditions That May Affect Disability Duration

(Note: This list may not include all possible complicating red flag conditions.)

- Severity of disease, hospitalization required (e.g., multi-lobar infection, bacteremia, pleurisy, hypothermia, respiratory failure, sepsis, septic shock, pleural effusion, empyema, and lung abscess.)
- Presence of co-morbid condition(s):
    - Lung disease
    - Cancer
    - Heart failure
    - Cerebrovascular disease
    - Renal disease
    - Liver disease
    - Diabetes
    - Immunocompromising conditions
- Chronic smoker
- Advanced age
- Delayed referral to case management

- Attorney involvement
- Employee / employer issues
- Mental health / substance abuse issues
- Job with significant safety component that may be impacted by patient's condition or treatment
- Other factors include lack of compliance and associated neurological, orthopedic, or systemic conditions that prevent aggressive rehabilitation

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Return to Work Goals

Note:

- *Return to work will be patient, condition, and employer specific. Return to work will be dependent upon the individual patient, type of employment, level of disability, severity of condition, timing of treatment, treatment plan and presence of disability red flags.
    - Information on long-term effects of COVID-19 is emerging
        - Individuals with long-term effects may require a longer return to work timeframe or return to work energy accommodations such as (Herrera, 2021):
            - Working a limited number of hours
            - Working from home
            - Adjusting work activities
            - Using durable medical equipment
            - Additional breaks
            - Adjusting the work environment
            - Referral to vocational rehabilitation counselor can be helpful in structuring the return activities and communicating with employers
    - Isolation precautions will impact return to work
    - Those who were severely ill with COVID-19 and those with a weakened immune system may need to isolate longer

Quarantine Only:

- The individual may return to work without restrictions, after the quarantine period, if no symptoms develop, lab tests do not detect the virus, or they are cleared by treating physician and CDC
- No special work-place precautions are necessary for cleared returning worker.
- Each individual should defer to their employer's human resource department for return to work quarantine parameters

(ACEP, 2022; CDC, 2022c; ODG by MCG, 2021b)

Without hospitalization based on current CDC isolation protocol

	Job Category	PT	FT	
Physical	Sedentary/Light	0	5	17*
	Medium	0	5	17*
	Heavy/Very Heavy	5	5	17*

With pneumonia

	Job Category	PT	FT	
Physical	Sedentary/Light	17	21	25
	Medium	20	25	30
	Heavy/Very Heavy	22	28	34

With hospitalization, not ICU, duration following discharge

	Job Category	PT	FT	
Physical	Sedentary/Light	8	10	12
	Medium	8	10	12
	Heavy/Very Heavy	8	10	12

Severe, with ICU admission, duration following discharge

	Job Category	PT	FT	
Physical	Sedentary/Light	24	30	36
	Medium	29	36	43
	Heavy/Very Heavy	34	42	50

- Recommended return to work targets are developed from national aggregate data published by OSHA and CDC.
- **NUMBER OF DAYS** is understood as equivalent to wage replacement benefit days, or 5 per week: divide number of days displayed by 5 to determine estimated weeks of disability.
- Disability durations (PT/FT) are the **NUMBER OF DAYS** from confirmed diagnosis and onset of treatment by which time the clinical indicators should be resolving and the patient should be able to return to work. When 0 (zero) days are recommended it means that the condition is acute and mild and that clinical indicators, if present, would not be expected to result in time off work.
- **Clinical indicators** are features of injuries or conditions (e.g., pain) that are known to influence a patient's ability to return to full duty work.
- **"RESOLVING"** clinical indicators mean that the patient is showing progress and that no new symptoms or red flag conditions are present. "Resolving" does not mean that the clinical indicators are absent or cured or that the patient has completed treatment.
- Scheduling modifications should be considered along with duty restrictions to promote early safe RTW and allow for concurrent treatment.
- Part-time (PT) disability durations apply to return to work at **part time/modified duty, full time/modified duty,** or **part time/full duty.** Full-time (FT) disability durations apply to **full time/full duty** return to work.

- **RED FLAGS** signify the presence of one or more conditions that may prolong disability. Special case management efforts may be needed for patients who have red flag conditions.
- N/A signifies that a patient is unlikely to return to work.

Case Management Directives: Coronavirus

History

- Document current vs. pre-infection baseline physical and psychological functioning.
    - Obtain history including symptoms, severity, duration, diagnostic tests completed, comorbidities, complicating factors, and benefits.

Communication

- Develop trusting relationship by employing skillful reflective listening techniques and therapeutic responses.
    - Promote verbalization of anxieties, concerns, and fears.
    - Recognize defense mechanisms (denial, rationalization, displacement, regression, anger) as emotional grieving processes.
    - Encourage using relaxation, distraction, and guided imagery techniques.
    - Project professional empathetic demeanor while promoting self-care activity progression or facilitating comfort care measures.
    - Facilitate identification and confirmation of diagnosis via thorough communication and timely testing.

Plan

- Develop care plan and goals that documents consensus on treatment plan, including surgery, rehabilitation, equipment, follow-up care and care settings.
    - Coordinate care with individual, caregiver, family, physician, specialist, pharmacist, and care director at treating facility or agency.
    - Advocate for the individual by managing resources and vendors for cost and utilization appropriateness.
    - Anticipate and coordinate transitions between care settings (general or rehabilitation).
    - Refer to DME section for devices or equipment to consider.
    - Monitor effectiveness of CM interventions and routinely revise goals and plan of care as needed.

Education

- Explain recovery course, prognosis, and care plan in language matching the individual's and caregiver's level of comprehension.
    - If prolonged bed rest required, direct prompt recognition and reporting of signs and symptoms of complications: infection, mental changes, pain, open sores anywhere on the body, and respiratory changes.
    - If ventilator assistance required, instruct regarding pain control, tracheostomy tube (if applicable) placement and removal, pulmonary care, and ways to facilitate ambulation.
- Discuss necessary options for physician and injured worker on high-quality post-covid clinics

Clinics

- Test to Treat program
    - Federal program that is designed to provide a fast approach to testing and treatment for COVID-19
    - People are able to get tested for COVID-19. If they test positive and treatments are appropriate for them, a health care provider will prescribe medication for them and their prescription will be filled all at one location.
    - People can also bring test results obtained from a home testing kit to Test to Treat sites and get evaluated by a healthcare provider for treatment
    - To locate a site:
        - Call Center: 1-800-232-0233 (TTY 1-888-720-7489)
        - Website: https://aspr.hhs.gov/testtotreat/Pages/default.aspx
- Elements of high-quality clinics include (Choo, 2021):
    - Access to a wide range of physician specialists such as:
        - Pulmonology, cardiology, integrative medicine, family medicine, behavioral health, critical care, and neurology
    - Full complement of allied health professionals, such as:
        - Physical Therapy
        - Occupational therapy
        - Speech pathology
        - Pulmonary rehabilitation
    - National Institute of Health (NIH) Research Initiative
    - Peer support groups
- COVID-19 recovery clinics have been established throughout the country
    - Examples of clinics include, but are not limited to:
        - Cleveland-based MetroHealth
        - Los Angeles-based Cedars-Sinai
        - Edison, N.J.-based Hackensack Meridian Health
        - Westchester (N.Y.) Medical Center
        - UAB Medicine in Birmingham, Alabama
        - Concord, Mass.-based Emerson Hospital
        - New York City-based Mount Sinai Health System
        - UChicago Medicine
        - Aurora, Colo.-based UCHealth
        - San Francisco-based UCSF Health
        - Philadelphia-based Penn Medicine
        - Morristown, N.J.-based Atlantic Health System
        - Boston-based Spaulding Rehabilitation Hospital.

        - New York City-based Montefiore Medical Center
        - Louisville, Ky.-based Norton Children's Hospital
        - Yale New Haven (Conn.) Hospital
        - University of Maryland Baltimore Washington Medical Center
        - Chicago-based Rush University Medical Center
        - Cedar Rapids, Iowa-based Mercy Medical Center
        - Cleveland Clinic
        - Oregon Health & Science University in Portland
        - Houston-based Baylor College of Medicine
        - Hartford (Conn.) HealthCare
        - Galveston, Texas-based UTMB Health
        - Fort Wayne, Ind.-based Parkview Health
        - St. Louis-based Washington University School of Medicine
        - Washington, D.C.-based George Washington University
        - Bethlehem, Pa.-based St. Luke's University Health Network
        - Philadelphia-based Temple Health
        - New Brunswick, N.J.-based Saint Peter's Healthcare System
        - Danbury, Conn.-based Nuvance Health
        - Atlanta-based Piedmont Healthcare
        - Houston Methodist
        - University of Kansas Medical Center in Kansas City
        - Chicago-based Loyola Medicine
        - Ellenville (N.Y.) Regional Hospital
        - University of Miami Health System
        - University of Iowa Hospitals & Clinics in Iowa City
        - Reno, Nev.-based Renown Health
    - A list of Post-Covid Clinics in New York City can be found at:
        - https://www1.nyc.gov/assets/doh/downloads/pdf/covid/covid-19-care-clinics.pdf

Support Groups

- Provide contact information for local and national support groups
    - Survivor Corps
        - Website: https://www.survivorcorps.com/
        - Provides support for COVID-19 Survivors

Resolving

- Return to Independence
    - Ensure and document return to independent or stabilized functional status as improvements occur
    - Evaluate and respond to areas of remaining concerns by facilitating increased independent problem solving
    - Augment individual's and caregiver's capacity to cope by confirming connections with community resources and support groups
    - Obtain understanding of individual's expectations regarding continuation of medical, physical, and home care interventions
    - Discontinue (in a systematic fashion) the services and interventions, such as equipment and therapies that are no longer required

- Discharge
    - Document closing conversations with patient, caregiver, physician, pharmacist, and care providers as appropriate
    - Confirm removal of rental equipment and contract closures
    - Explain how CM connection can be reestablished if necessary

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ICD9s, ICD10s, & CPTs: Coronavirus

ICD9 List:

Code	Description

CPT List:

Code	Description

ICD10 List:

Code	Description

Physical Therapy/Chiropractic:

Code	Description