Coronavirus

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Description: Coronavirus

ICD10
B34.2,B97.2,B97.21,B97.29,J12.81,J12.89,J20.8,J22,J40,J80,J98.8,L50.0,R05,R06.02,R50.83,R50.9,T50.B95A,T50.Z95A,T80.52XA,T88.1XXA,U07.1,U09.9,Z03.818,Z11.59,Z20.828,Z28.04,Z88.7
CPT
0225U,0226U,86328,86408,86409,86769,87426,87635,98966,98967,98968,99000,99001,99211,99441,99442,99443,99453,99454,99457,C9803,G2010,G2012,U0001,U0002,U0003,U0004

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. The novel coronavirus, SARS CoV-2, was identified in 2019. Investigations regarding 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 *(*McIntosh, 2023b).

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 recently 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, 2020a; McIntosh, 2022a):

- 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-1 (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. In rare cases, animal coronaviruses are spread to people. Three recent examples of this are COVID-19, SARS-CoV, and MERS-CoV (IPAC, 2023; McIntosh, 2022a).

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus called SARS-associated coronavirus (SARS-CoV-1). 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. The initial term for the disease was severe acute respiratory syndrome" (SARS) and the identified case was a novel coronavirus termed SARS coronavirus (SARS-CoV). Once another novel coronavirus emerged in 2019 and was designated SARS-CoV-2, SARS-CoV became known as SARS-CoV-1 (McIntosh, 2023e).

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, 2023c).

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. The virus rapidly spread worldwide and became a global health emergency, which lasted more than three years and ended in May 2023 (CDC, 2022a; McIntosh, 2022a).

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 September 2023, there are not any SARS-CoV-2 variants that have risen to the level of high consequence. "Variants of Concern" have evidence of an increase in transmissibility,

greater risk of severe disease, a significant reduction in neutralization by antibodies generated during previous infection or vaccination, or reduced effectiveness of treatments or vaccines. Omicron variants have been the predominant circulating variants globally since 2022 . Prior Variants of Concern that are no longer circulating include the Alpha, Beta, Gamma, and Delta variants (McIntosh, 2023a; CDC, 203f).

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, 2022a; McIntosh, 2023a; MDGuidelines, 2024).

The incubation period of SARS-CoV-2 is thought to be within 14 days following exposure, most cases occur approximately four to five days after exposure. 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. Transmission after 10 days is unlikely. The risk of transmission increases with closeness and duration of contact with an individual with COVID-19. It appears highest with prolonged contact in an indoor setting Additional factors that increase the risk of transmission include (CDC, 2022c; McIntosh, 2023a):

- Activities such as coughing, singing, shouting or breathing heavily due to exertion
- Infected individual was symptomatic at time of contact
- Neither individual was masked during contact
- Indoor setting with poor ventilation or filtration
- Very close or touching contact
- Crowded events

The clinical picture of COVID-19 may differ based on the specific COVID-19 variant. 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 (McIntosh, 2022a).

Possible risk factors for progressing to severe illness may include, but are not limited to (CDC, 2023g; Cennimo, 2023a; McIntosh, 2022a):

- 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 fibrosis
        - 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
    - 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)
    - Dementia
    - 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
- Physical inactivity
- Pregnancy
- Smoking
    - Current or former
- Substance abuse disorders
- Males have a higher number of critical cases and deaths due to COVID-19
- Black, Hispanic, and Southern Asian individuals comprise a disproportionately high number of infections and deaths due to COVID-19

Certain laboratory abnormalities have been associated with worse outcomes of COVID-19, such as (Cennimo, 2023a; McIntosh, 2022a):

- Lymphopenia
- Thrombocytopenia
- Elevated liver enzymes
- Elevated lactate dehydrogenase
- Elevated inflammatory markers (e.g., C-reactive protein, ferritin) and inflammatory cytokines (i.e., interleukin 6 and tumor necrosis factor-alpha)
- Elevated D-dimer (>1 mcg/mL)
- Elevated prothrombin time

- Elevated troponin
- Elevated creatine phosphokinase
- Acute kidney injury

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 (Cennimo, 2023):

- 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
        - Taken by a healthcare provider and processed by laboratory
    - 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
    - Unable to detect difference between antibodies from infection and those from a vaccine

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; ODG by MCG, 2024a).

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 Center for Disease recommends testing for current infection in the following situations (CDC, 2023c):

- 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.

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, 2023d).

The below recommendations are current as of May 11, 2023. 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, 2023d)

- 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 the first full day following testing
- 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
    - Those who were asymptomatic may end isolation after 5 full days after the positive test
        - Masks should be worn through day 10
    - If symptoms are present
        - Symptoms are improving, isolation may end after 5 full days if fever-free for 24 hours (without the use of fever-reducing medication)
        - Symptoms are not improving continue to isolate past 5 days until fever-free for 24 hours and symptoms improve
    - Those who were moderately ill with shortness of breath or difficulty breathing should isolate through 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

Vaccination:
There are currently two types of vaccines available in the United States for the prevention of COVID-19, mRNA vaccines and protein subunit vaccines. Vaccines are recommended for everyone age 6 months and older in the United States. The recommended vaccine type and number of updated COVID-19 vaccine (2023–2024 Formula) doses are based on age and vaccination history. 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 Novavax vaccine is a protein subunit vaccine, it 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 (Cennimo, 2023a; CDC, 2024a; FDA, 2023d).

The COVID-19 vaccines available in the United States are (Cennimo, 2023a; CDC, 2024a; FDA, 2023d):

- 2023-2024 Pfizer-BioNTech COVID-19 vaccine, available for people age 6 months and older.
- 2023-2024 Moderna COVID-19 vaccine, available for people age 6 months and older.
- 2023-2024 Novavax COVID-19 vaccine, available for people age 12 years and older.

For an updated guidance on vaccination schedules and administration see

- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/stay-up-to-date.html

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. Reports of adverse events following the administration of the vaccine suggest an increased risk of thrombosis with thrombocytopenia syndrome and Guillain-Barré syndrome. As of May 2023, all doses of the adenoviral vector vaccine Janssen/Johnson & Johnson

COVID-19 vaccine have expired, and this vaccine is no longer available in the United States (Cennimo, 2023a; Edwards & Orenstein, 2023; FDA, 2023d).

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, 2023):

- On the injected arm:
  - Pain
  - Redness
  - Swelling
  - Pruritis
- 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, 2024a).

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, 2023e):

- 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 after primary series vaccination. For those 18 years of age and older Pfizer-BioNTech, Moderna, or Novavax booster vaccine can be used following any of the primary series vaccination. 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". The indication and timing of the

booster dose depends on which primary series was administered. The CDC recommends that everyone aged 5 years and older should get 1 dose of an updated COVID-19 vaccine to protect against serious illness from COVID-19. (CDC, 2023e; Cennimo, 2023a).

Everyone aged 6 months and older who is moderately or severely immunocompromised needs at least 1 dose of a 2023-2024 updated COVID-19 vaccine. Depending on the number of doses previously received, additional doses of updated vaccine may be needed (CDC, 2024a; CDC, 2023e).

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

- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/stay-up-to-date.html

Long-term symptoms/ Complications:
A portion of people infected with COVID-19 do not fully recover within a few weeks. This has also been referred to as post-COVID-19 syndrome, postacute COVID-19, long COVID, long-term effects of COVID, long-haul COVID, or post-acute sequelae of SARS-CoV-2 infection (PASC or P-A-S-C). The Department of Health and Human Services (HHS) in collaboration with CDC developed the following definitions (HHS, 2023b):

- Long COVID is a patient created term broadly defined as signs, symptoms, and conditions that continue or develop after initial SARS-CoV-2 infection. The signs, symptoms, and conditions are present four weeks or more after the initial phase of infection; may be multisystemic; and may present with a relapsing–remitting pattern and progression or worsen over time, with the possibility of severe and life-threatening events even months or years after infection. Long COVID is not one condition. It represents many potentially overlapping entities, likely with different biological causes and different sets of risk factors and outcomes.
- Post-COVID-19 Conditions is equivalent to the lay term Long COVID, and is used to describe the new, returning, or ongoing health problems people can experience four or more weeks after initial infection with the SARS-CoV-2 virus, the virus that causes COVID-19.
- Post-acute Sequelae of SARS CoV-2 infection is a term used in the scientific and medical communities that refers to ongoing, relapsing, or new symptoms or other health effects occurring after the acute phase of SARS-CoV-2 infection.

Long-term effects are most often reported in individuals with severe illness, but also occurs 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). Those who are not vaccinated against COVID-19 and become infected may have a higher risk of developing Long COVID compared to vaccinated individuals. There is limited information on the prevalence, duration, etiology, and treatment strategies for the persistent symptoms (Mikkelsen & Abramoff, 2023b; NICE, 2021). 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 (Carfi, 2020).

The reported ongoing complications have ranged from mild fatigue to multiple organ failure, the symptoms can last weeks, months or years after infection. Some of the symptoms and complications that have been reported to persist include (Ahmed, 2020; Cennimo, 2023a; Hackensack Meridian Health, 2020; Logue, 2021; Mikkelsen & Abramoff, 2023b; NIH, 2023; 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
    - Chest pain or tightness
    - Palpitations
    - Muscle pain
    - Sore throat
    - Runny nose
    - Joint pain
    - Headache
    - Difficulties with cognition
        - Brain fog
    - Loss of taste or smell
    - Poor appetite
    - Hair loss
    - Nausea
    - Diarrhea
    - Ear pain
    - Rash
    - Fevers
    - Chills or shivering
    - Sweating
    - Reduced libido
    - 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

Long COVID was added as a recognized condition that could result in a disability under the Americans with Disabilities Act (ADA) in July 2021. 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. The public health emergency (PHE) ended on May 11, 2023. Most tools like vaccines, treatments and testing remain effective. However, some of the reporting frequency and source data has changed (CDC, 2023h; McIntosh, 2022a).

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.

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

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 that are opposed to a 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, 2022; 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 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

[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.

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].

Ben et al (2023) aimed to examine zinc efficacy in adult patients with COVID-19 infection. A total of 470 patients who tested positive for COVID-19 without end-organ failure were randomized to oral zinc (n=231) or matching placebo (n=239) for 15 days. The length of hospital stay was shorter in the zinc group than in the placebo group. The duration of COVID-19 symptoms decreased with zinc treatment versus placebo in outpatients. The subgroup analysis revealed that the benefit was especially observed in aged patients and those with comorbid conditions or those who need oxygen. In summary, oral zinc treatment for 15 days is associated with a nearly 40% reduction in death and ICU admission, with shortening of symptom duration. The authors note that the trial has limitations including generalizability is limited beyond patients with moderate clinical severity [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].

Ley et al (2023) evaluated the risk of neurological and psychiatric sequelae two years after hospitalization or intensive care admission with COVID-19 compared to admissions for other causes. The retrospective study analyzed electronic health records (EHR) data A total of 280,173 patients admitted to hospital and 46,573 patients admitted to ICU with COVID-19 were successfully matched to an equal number of patients admitted to hospital or ICU for any other reason. Those hospitalized with COVID-19 were found to be at a greater risk of a range of neurological and psychiatric outcomes including seizure/epilepsy, encephalitis, myoneural junction/muscle disease, Guillain-Barre syndrome (GBS), dementia, cognitive deficits, psychotic disorder, mood and anxiety disorders, but not ischemic stroke or intracranial hemorrhage. When risks were elevated after COVID-19, the majority remained so for the whole two years of follow-up, except for mood and anxiety disorders. When elevated, the risks in those admitted to ICU with COVID-19 were mostly not long lasting. The authors conclude that the risks of neurological and psychiatric sequelae in patients hospitalized with COVID-19 are wide ranging and long standing whereas

those in patients admitted to ICU with COVID-19 are similar to, or lower than, the risks observed post-ICU admission for any other cause [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/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

- 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
    - Hospitalized patients should be placed in a well-ventilated single-occupancy room with a closed door and dedicated bathroom
        - An airborne infection isolation room should be prioritized for patients undergoing aerosol-generating procedures
- 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

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Related Guidelines

Bronchitis
Chronic Obstructive Pulmonary Disease
Pneumonia, Community-Acquired
Pulmonary Embolism, Infarction
Thrombophlebitis (Superficial and Deep Vein Thrombosis)
Chronic Fatigue Syndrome

Sunset Clause

This guideline was developed in February 2020 and most recently updated in 2024 in an evidence-based approach and formal consensus-based process. All Genex guidelines undergo a comprehensive review at a minimum of every 2 years with interim updates as appropriate. This guideline is effective from April 1, 2024 to April 1, 2026.

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
- Long COVID symptoms (Mikkelsen & Abramoff, 2023b):
    - 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
    - Chest pain or tightness
    - Palpitations
    - Muscle pain
    - Sore throat
    - Runny nose
    - Joint pain
    - Headache
    - Difficulties with cognition
        - Brain fog
    - Loss of taste or smell
    - Poor appetite
    - Hair loss
    - Nausea
    - Diarrhea
    - Ear pain
    - Rash
    - Fevers
    - Chills or shivering
    - Sweating
    - Reduced libido
    - Post-exertional malaise
    - Sleep problems

(Cascella, 2023; Cennimo, 2023; McIntosh, 2023b; MDGuidelines, 2024)

Objective Findings

- Persistent cough
- Fever
- 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"
- Conjunctivitis
- Potential Acute complications of COVID-19 (McIntosh, 2023b):
    - 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

(Cascella, 2023; Cennimo, 2023; McIntosh, 2023b; MDGuidelines, 2024)

Diagnostic Tests

- Viral tests
    - Viral testing with PCR or antigen testing should be performed either at the time of COVID-19-like symptom onset, or within several days of the onset of symptoms consistent with a COVID-19 infection
    - Real-time reverse-transcriptase polymerase chain reaction (RT-PCR) assay (ACOEM, 2023; McIntosh, 2023a):
        - Amplify viral particles to identify small amounts of the virus
        - Commercial PCR assays have been authorized by the FDA using specimens obtained from nasopharyngeal swabs as well as other sites such as oropharyngeal, anterior/mid-turbinate nasal swabs, nasopharyngeal aspirates, bronchoalveolar lavage (BAL) and saliva.

        - 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, 2023; FDA, 2023c)
        - Immunoassays that detect the presence of specific viral proteins either on or within the virus
        - Recommended for the diagnosis of COVID-19
        - Performed on nasopharyngeal, nasal mid-turbinate or nasal swab specimens
            - Not to be used with oral or salivary specimens
        - Rapid-response testing that can deliver results within fifteen minutes
        - Home test kits (FDA, 2023c; HHS, 2023a)
            - 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 United States are eligible to order 4 free at-home tests from USPS.com
                    - https://special.usps.com/testkits
- Antibody testing (McIntosh, 2023a)
    - 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:
    - 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 (Cascella, 2023; NIH, 2023)
    - Chest CT (ACR, 2020; Cennimo, 2023a):
        - 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, 2023a; MDGuidelines, 2024)
        - May demonstrate findings consistent with pneumonia
        - Should not be used as stand-alone screening tool
- Electrocardiogram (NIH, 2023)
- Long-term symptoms may require additional testing (Mikkelsen & Abramoff, 2023b; NICE, 2021):
    - Chest imaging (CXR, CT, HRCT, CT-pulmonary angiography)
    - Cardiac testing (EKG, transthoracic echocardiography)
    - Pulmonary function testing
    - Electrodiagnostic testing

(ACOEM, 2023; Caliendo & Hanson, 2022; Cascella, 2023; Cennimo, 2023a; McIntosh, 2023b; MDGuidelines, 2024)

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

Treatment (ACOEM, 2023; Cascella, 2023; Cohen, 2022; IDSA, 2023; Kim & Gandhi, 2023; McIntosh, 2023a; MDGuidelines, 2024; NIH, 2023):

- General care
    - Individuals suspected of COVID-19 infection should be immediately isolated and given mask
    - Hospitalized patients should be placed in a well-ventilated single-occupancy room with a closed door and dedicated bathroom
        - An airborne infection isolation room should be prioritized for patients undergoing aerosol-generating procedures
    - 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:
        - Clinical presentation
        - The patient's ability to engage in monitoring and the risk of transmission in the patient's home environment
    - Majority of patients will have mild illness and can be treated at home with rest, fluids and over-the counter medications for symptom relief (MDGuidelines, 2024)
- Supportive therapy (IDSA, 2023; McIntosh, 2023a; NIH, 2023)
    - 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, 2023; NIH, 2023)
        - 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, 2023; Anesi, 2023; Cuker & Peyvandi, 2024)
        - 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 if concomitant bacterial infection is confirmed or strongly suspected (MDGuidelines, 2024)
- FDA Approved Treatment (NIH, 2023; IDSA, 2023; FDA, 2023f)
    - Nirmatrelvir with Ritonavir (Paxlovid)
        - Start as soon as possible and up to 5 days
    - Remdesivir (Veklury)
        - Start as soon as possible and up to 7 days
    - Olumiant (baricitinib)
    - Actemra (tocilizumab)
- Emergency use authorization (EUA) programs allowed for rapid deployment of potential therapies for investigation and investigational therapies with emerging evidence (ACOEM, 2023; Cascella, 2023; Cohen, 2022; IDSA, 2023; Kim & Gandhi, 2023; McIntosh, 2023a; NIH, 2023):
    - Investigational agents that have received Emergency Use Authorization (EUA) for the treatment of COVID-19 includes but are not limited to the following (ACOEM, 2023; Cohen, 2022; IDSA, 2023; Kim & Gandhi, 2023; McIntosh, 2023a)
        - Lagevrio (Molnupiravir)
        - Baricitinib
        - Tofacitinib
        - Sarilumab
        - 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)
        - Blood related therapies
            - Convalescent plasma (FDA, 2022a; Kim & Gandhi, 2023):
                - Convalescent plasma obtained from individuals who have recovered from the virus and is given to patients with COVID-19 infection
            - Hyperimmune globulin
            - Both treatment options use antibody-rich blood products made from blood donated by people who have recovered from the virus
- The National Institute of Health does NOT recommend the following medications for the treatment of COVID-19, despite some receiving Emergency Use Authorization (Cascella, 2023; NIH, 2023)
    - Chloroquine or hydroxychloroquine with or without azithromycin
    - Lopinavir/ritonavir
    - Azithromycin
    - Doxycycline
    - Colchicine
    - Fluvoxamine
    - Ivermectin

    - Inhaled corticosteroids
    - Metformin
    - Excess supplementation of vitamin C, vitamin D, and zinc
    - Interferons alfa, beta, or lambda
    - Nitazoxanide
    - Bamlanivimab plus etesevimab
    - Bebtelovimab
    - Casirivimab plus imdevimab
    - Sotrovimab
- Treatments that are under investigation for COVID-19 but do not have EUA or FDA approval include (ACOEM, 2023; Cascella, 2023; Cohen, 2022; IDSA, 2023; Kim & Gandhi, 2023; McIntosh, 2023a; NIH, 2023):
    - Baricitinib alone
    - AT-527
    - Niclosamide
    - Lopinavir-ritonavir
    - Favipiravir
    - Interleukin (IL)-6 receptor inhibitor
        - 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
    - A registry of international clinical trials can be found at www.clinicaltrials.gov
- Quarantine and Isolation (CDC, 2023d; McIntosh, 2023a)
    - Those who were exposed to COVID-19 should wear a mask when in public and monitor for symptoms at least 10 full days
        - Get tested at least 5 days after the last day of exposure
            - If test is positive then individual should isolate
        - 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

- Isolation
  - 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 the first full day following testing
  - 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
    - Those who were asymptomatic may end isolation after 5 full days after the positive test
      - Masks should be worn through day 10
    - If symptoms are present
      - Symptoms are improving, isolation may end after 5 full days if fever-free for 24 hours (without the use of fever-reducing medication)
      - Symptoms are not improving continue to isolate past 5 days until fever-free for 24 hours and symptoms improve
    - Those who were moderately ill with shortness of breath or difficulty breathing should isolate through 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 (Chippa, 2023; Mikkelson, 2023b; NICE, 2021):
  - 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.
    - Patients should be screened for common psychological issues such as anxiety, depression, insomnia, PTSD and referred to behavioral health specialists if needed (Chippa, 2023)
    - Encourage people to keep a record of, or use a tracking app to monitor, their goals, recovery and any changes in their symptoms

- **Prevention** (Cennimo, 2023; McIntosh, 2022a)
    - Pre-exposure
        - As of January 2024, no biomedical intervention other than vaccines prevents COVID-19 disease.
        - The FDA authorized the use of the anti-SARS-CoV-2 monoclonal antibodies tixagevimab plus cilgavimab (Evusheld) as pre-exposure prophylaxis (PrEP) of COVID-19 in people who were not expected to mount an adequate immune response to COVID-19 vaccination and in people with COVID-19 vaccine contraindications.19
            - Due to the increased prevalence of Omicron subvariants that are not susceptible to tixagevimab plus cilgavimab, this combination is not currently authorized by the FDA for use as PrEP of COVID-19
    - Postexposure prophylaxis
        - As of January 2024, no biomedical intervention other than vaccines prevents disease after exposure to SARS-CoV-2.
        - The FDA authorized the use of the anti-SARS-CoV-2 monoclonal antibody products bamlanivimab plus etesevimab and casirivimab plus imdevimab as post-exposure prophylaxis (PEP) in certain people at high risk of progression to severe COVID-19.
            - However, the Omicron subvariants are not susceptible to these products; therefore, their use as SARS-CoV-2 PEP is not recommended
    - 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
            - Vaccine recommendations are based on age, and in some cases, time since last dose, the first vaccine received, and immunocompromised status.
            - See the CDC's website for most current vaccine recommendations:

        - https://www.cdc.gov/coronavirus/2019-ncov/vaccines/stay-up-to-date.html
    - Currently three vaccines are available (Cennimo, 2023a; FDA, 2023d).
        - See Description section for details on parameters
        - Messenger RNA vaccines
            - Pfizer-BioNTech
            - Moderna
        - Novavax.
            - Approved for ages 12 and older
        - 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, 2021)
                - 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
            - 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
    - Additional vaccines are being developed, including nucleic acid-based (mRNA and DNA) vaccines, viral-vector vaccines, and inactivated or recombinant protein vaccines (McIntosh, 2022a)
    - Efforts are underway to prepare a vaccine for the prevention of SARS and MERS (McIntosh, 2023b; McIntosh, 2023e)
- Travel (CDC, 2023i)
    - 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
            - Recommendations for international travel
                - 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, 2023a)
            - 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
        - Facemasks (McIntosh, 2023a):
            - Mask-wearing is recommended in multiple situations
                - Indoor public transportation settings
                    - Masks are no longer required on public transportation conveyances or transportation hubs in the United States, but recommended by the CDC
                - All individuals who have suspected or documented COVID-19 or exposure to SARS-CoV-2
                - Individuals at risk for severe COVID-19 when in public settings where distancing is not feasible,
                - Household contacts of individuals with suspected or confirmed COVID-19 when in the same room
            - Individuals wear the mask with the highest filtration efficacy that fits well and that one can wear reliably over the mouth and nose
                - Respirators (N95) have the highest filtration efficacy followed by disposable medical masks
                - Cloth masks made with several layers can approach the filtration efficacy of medical masks
            - 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, 2023a)
    - 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, 2021a; Johns Hopkins, 2024)
        - 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, 2021a)
        - 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 (EPA, 2023).
    - 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

- Businesses and individuals may continue to implement strategies to reduce the risk of exposure to COVID-19 (OSHA, 2021):
  - Social distancing
  - Cleaning and disinfecting common and high traffic areas
  - Personal protective equipment and hand hygiene
  - Implement physical distancing
  - Educate and train employees on COVID-19 policies and procedures
  - 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
  - Facilitate employees getting vaccinated
  - 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; it is intended to be part of an infection control plan that includes uses of a thermometer

Centers for Disease Control (CDC) Guidance

The CDC offers information for a variety of specific groups. 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.
- Additional information can be found at: https://www.cdc.gov/coronavirus/2019-ncov/index.html

Guidance for exposure to COVID-19 and isolation:

- https://www.cdc.gov/coronavirus/2019-ncov/your-health/if-you-were-exposed.html
- https://www.cdc.gov/coronavirus/2019-ncov/your-health/isolation.html

Face masks:

- https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/masks.html

Testing:
- https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/testing.html

Vaccines:
- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/overview-COVID-19-vaccines.html
- https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html

Healthcare Professionals:
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, 2021)
- 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.

64550,93797,93798,97010,97012,97014,97016,97018,97022,97024,97026,97028,97032,97033,97034,97035,97036,97039,97110,97112,97113,97116,97124,97139,97140,97150,97161,97162,97163,97164,97165,97166,97167,97168,97530,97532,97533,97535,97537,97542,97545,97597,97598,97602,97605,97606,97607,97608,97610,97750,97760,97761,97762,97799,98940,98941,98942,98943,G0424

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
- Those with Long Covid may require self-monitoring at home with (Chippa, 2023):
  - Pulse oximeter
  - Blood pressure
  - Blood glucose monitors.

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.
    - 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
- 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

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

(CDC, 2023d; ODG by MCG, 2024b)

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
    - An interactive map of the United states is available with a list of clinics in each state:
        - https://www.survivorcorps.com/pccc
    - 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

CPT List:

Code	Description
0225U	NFCT DS DNA&RNA 21 TARGETS SARS-COV-2 AMP PROBE
0226U	SUROGAT VIR NEUTRLZJ TST SARSCOV2 ELISA PLSM SRM
86328	IA INFECTIOUS AGT ANTIBODY SARS-COV-2 COVID-19
86408	NEUTRALIZING ANTIBODY SARS-COV-2 SCREEN
86409	NEUTRALIZING ANTIBODY SARS-COV-2 TITER
86769	ANTB SEVERE AQT RESPIR SYND SARS-COV-2 COVID-19
87426	IAAD IA SEVERE AQT RESPIR SYND CORONAVIRUS
87635	IADNA SARS-COV-2 COVID-19 AMPLIFIED PROBE TQ
98966	NONPHYSICIAN TELEPHONE ASSESSMENT 5-10 MIN
98967	NONPHYSICIAN TELEPHONE ASSESSMENT 11-20 MIN
98968	NONPHYSICIAN TELEPHONE ASSESSMENT 21-30 MIN
99000	HANDLG&/OR CONVEY OF SPEC FOR TR OFFICE TO LAB
99001	HANDLG&/OR CONVEY OF SPEC FOR TR FROM PT TO LAB
99211	OFFICE/OUTPATIENT EST PT MAY NOT REQ PHYS/QHP
99441	PHYS/QHP TELEPHONE EVALUATION 5-10 MIN
99442	PHYS/QHP TELEPHONE EVALUATION 11-20 MIN
99443	PHYS/QHP TELEPHONE EVALUATION 21-30 MIN
99453	REM MNTR PHYSIOL PARAM 1ST SET UP PT EDUCAJ EQP
99454	REM MNTR PHYSIOL PARAM 1ST DEV SUPPLY EA 30 D
99457	REMOTE PHYSIOLOGIC MONITORING 1ST 20 MIN MONTH
C9803	H O/P CLI SPEC CLCT SARS-COV-2 COVID-19 ANY SRC
G2010	REMOTE EVAL RECORDED VIDEO &/ IMAGES SB ESTAB PT
G2012	BRIEF COMMUNICATION TBS; 5-10 MIN MED DISCUSSION
U0001	CDC 2019 NOVEL CORONAVIRUS RT RT-PCR DX PANEL
U0002	2019-NCOV CORONAVIRUS SARS-COV-2/2019-NCOV
U0003	INF AGT DET DNA/RNA;SARS-COV-2 COVID-19 AMP P T
U0004	2019-NCOV CORONAVIRUS SARS-COV-2/COVID-19 ANY T

ICD10 List:

Code	Description
B34.2	CORONAVIRUS INFECTION UNSPECIFIED
B97.2	CORONAVIRUS CAUSE DISEASES CLASSIFIED ELSEWHERE
B97.21	SARS-ASSOC CORONAVIRUS CAUSE DZ CLASSIFIED ELSW
B97.29	OTH CORONAVIRUS CAUSE OF DZ CLASSIFIED ELSEWHERE
J12.81	PNEUMONIA DUE TO SARS-ASSOCIATED CORONAVIRUS
J12.89	OTHER VIRAL PNEUMONIA
J20.8	ACUTE BRONCHITIS DUE TO OTHER SPEC ORGANISMS
J22	UNSPECIFIED ACUTE LOWER RESPIRATORY INFECTION

J40	BRONCHITIS NOT SPECIFIED AS ACUTE OR CHRONIC
J80	ACUTE RESPIRATORY DISTRESS SYNDROME
J98.8	OTHER SPECIFIED RESPIRATORY DISORDERS
L50.0	ALLERGIC URTICARIA
R05	COUGH
R06.02	SHORTNESS OF BREATH
R50.83	POSTVACCINATION FEVER
R50.9	FEVER UNSPECIFIED
T50.B95A	ADVERSE EFFECT OTH VIRAL VACCINES INITIAL ENCNTR
T50.Z95A	ADVERS EFF OTH VACC BIOL SUBSTANCES INITIAL ENC
T80.52XA	ANAPHYLACTIC REACTION D/T VACCINATION INITIAL
T88.1XXA	OTH COMP FOLLOWING IMMUNIZATION NEC INITIAL ENC
U07.1	COVID-19
U09.9	POST COVID-19 CONDITION UNSPECIFIED
Z03.818	ENCOUNTER OBS SUSPCT EXPOS OTH BIO AGT RULED OUT
Z11.59	ENCOUNTER FOR SCREENING FOR OTHER VIRAL DISEASES
Z20.828	CONTACT W/ & EXPOSURE OTH VIRAL COMMUNICABLE DZ
Z28.04	IMMUNIZATION NOT CARRIED OUT PT ALLERGY VACCINE
Z88.7	ALLERGY STATUS TO SERUM AND VACCINE

Physical Therapy/Chiropractic:

Code	Description
64550	APPLICATION OF SURFACE NEUROSTIMULATOR
93797	OUTPATIENT CARDIAC REHAB W/O CONT ECG MONITOR
93798	OUTPATIENT CARDIAC REHAB W/CONT ECG MONITORING
97010	APPLICATION MODALITY 1/> AREAS HOT/COLD PACKS
97012	APPL MODALITY 1/> AREAS TRACTION MECHANICAL
97014	APPL MODALITY 1/> AREAS ELEC STIMJ UNATTENDED
97016	APPL MODALITY 1/> AREAS VASOPNEUMATIC DEVICES
97018	APPL MODALITY 1/> AREAS PARAFFIN BATH
97022	APPLICATION MODALITY 1/> AREAS WHIRLPOOL
97024	APPLICATION MODALITY 1/> AREAS DIATHERMY
97026	APPLICATION MODALITY 1/> AREAS INFRARED
97028	APPL MODALITY 1/> AREAS ULTRAVIOLET
97032	APPL MODALITY 1/> AREAS ELEC STIMJ EA 15 MIN
97033	APPL MODALITY 1/> AREAS IONTOPHORESIS EA 15 MIN
97034	APPL MODALITY 1/> AREAS CONTRAST BATHS EA 15 MIN
97035	APPL MODALITY 1/> AREAS ULTRASOUND EA 15 MIN
97036	APPL MODALITY 1/> AREAS HUBBARD TANK EA 15 MIN
97039	UNLISTED MODALITY SPEC TYPE&TIME CONSTANT ATTN
97110	THERAPEUTIC PX 1/> AREAS EACH 15 MIN EXERCISES
97112	THER PX 1/> AREAS EACH 15 MIN NEUROMUSC REEDUCA
97113	THER PX 1/> AREAS EACH 15 MIN AQUA THER W/XERSS
97116	THER PX 1/> AREAS EA 15 MIN GAIT TRAING W/STAIR
97124	THER PX 1/> AREAS EACH 15 MINUTES MASSAGE
97139	UNLISTED THERAPEUTIC PROCEDURE SPECIFY
97140	MANUAL THERAPY TQS 1/> REGIONS EACH 15 MINUTES

97150	**THERAPEUTIC PROCEDURES GROUP 2/> INDIVIDUALS**
97161	**PHYSICAL THERAPY EVALUATION LOW COMPLEX 20 MINS**
97162	**PHYSICAL THERAPY EVALUATION MOD COMPLEX 30 MINS**
97163	**PHYSICAL THERAPY EVALUATION HIGH COMPLEX 45 MINS**
97164	**PHYSICAL THERAPY RE-EVAL EST PLAN CARE 20 MINS**
97165	**OCCUPATIONAL THERAPY EVAL LOW COMPLEX 30 MINS**
97166	**OCCUPATIONAL THERAPY EVAL MOD COMPLEX 45 MINS**
97167	**OCCUPATIONAL THERAPY EVAL HIGH COMPLEX 60 MINS**
97168	**OCCUPATIONAL THER RE-EVAL EST PLAN CARE 30 MINS**
97530	**THERAPEUT ACTVITY DIRECT PT CONTACT EACH 15 MIN**
97532	**DEVELOPMENT OF COGNITIVE SKILLS EACH 15 MINUTES**
97533	**SENSORY INTEGRATIVE TECHNIQUES EACH 15 MINUTES**
97535	**SELF-CARE/HOME MGMT TRAINING EACH 15 MINUTES**
97537	**COMMUNITY/WORK REINTEGRATION TRAING EA 15 MIN**
97542	**WHEELCHAIR MGMT EA 15 MIN**
97545	**WORK HARDENING/CONDITIONING 1ST 2 HR**
97597	**DEBRIDEMENT OPEN WOUND 20 SQ CM/<**
97598	**DEBRIDEMENT OPEN WOUND EACH ADDITIONAL 20 SQ CM**
97602	**RMVL DEVITAL TISS N-SLCTV DBRDMT W/O ANES 1 SESS**
97605	**NEGATIVE PRESSURE WOUND THERAPY DME </= 50 SQ CM**
97606	**NEGATIVE PRESSURE WOUND THERAPY DME >50 SQ CM**
97607	**NEG PRESSURE WOUND THERAPY NON DME </= 50 SQ CM**
97608	**NEG PRESSURE WOUND THERAPY NON DME >50 SQ CM**
97610	**LOW FREQUENCY NON-THERMAL ULTRASOUND PER DAY**
97750	**PHYSICAL PERFORMANCE TEST/MEAS W/REPRT EA 15 MIN**
97760	**ORTHOTICS MGMT & TRAING INITIAL ENCTR EA 15 MINS**
97761	**PROSTHETICS TRAINING INITIAL ENCTR EA 15 MINS**
97762	**CHECKOUT ORTHOTIC/PROSTHETIC ESTAB PT EA 15 MIN**
97799	**UNLISTED PHYSICAL MEDICINE/REHAB SERVICE/PX**
98940	**CHIROPRACTIC MANIPULATIVE TX SPINAL 1-2 REGIONS**
98941	**CHIROPRACTIC MANIPULATIVE TX SPINAL 3-4 REGIONS**
98942	**CHIROPRACTIC MANIPULATIVE TX SPINAL 5 REGIONS**
98943	**CHIROPRACTIC MANIPLTV TX EXTRASPINAL 1/> REGION**
G0424	**PULM REHAB INCL EXER 1 HR PER SESS TO 2 PER DAY**