Background

Some patients who have been infected with SARS-CoV-2 have new, recurring, or ongoing symptoms and clinical findings more than four weeks after infection, sometimes after initial symptom recovery. Post-COVID conditions can occur in patients who had varying degrees of illness during acute infection, including those who had mild or asymptomatic infections. Medical and research communities are still learning about these post-acute symptoms and clinical findings.

Post-COVID conditions are being referred to by a wide range of names, including post-acute COVID-19, long-term effects of COVID, long COVID, post-acute COVID syndrome, chronic COVID, long-haul COVID, late sequelae, and others, as well as the research term post-acute sequelae of SARS-CoV-2 infection (PASC). Although standardized case definitions are still being developed, in the broadest sense, it can be considered a lack of return to a usual state of health following acute COVID-19 illness. It might also include development of new or recurrent symptoms that occur after the symptoms of acute illness have resolved.

Scientific knowledge is still limited about these effects, including what causes them and how often they occur. Interim terminology will be updated as more information becomes available.

Post-COVID Conditions

We use post-COVID conditions as an umbrella term for the wide range of health consequences that are present more than four weeks after infection with SARS-CoV-2, the virus that causes COVID-19 illness. The time frame of more than four weeks provides a rough approximation of effects that occur beyond the acute period, but the timeframe might change as we learn more.

It can be difficult to distinguish symptoms caused by post-COVID conditions from symptoms that occur for other reasons. Patients experiencing the acute and post-acute effects of COVID-19, along with social isolation resulting from pandemic mitigation measures, frequently suffer from symptoms of depression, anxiety, or mood changes. Alternative reasons for health problems, such as other diagnoses, unmasking of pre-existing health conditions, or even reinfection. For clinicians considering whether new symptoms could be explained by reinfection, please refer to the CDC guidance on investigating suspected reinfection.

It is also possible that some patients with post-COVID conditions will not have had positive tests for SARS-CoV-2 because of a lack of testing or inaccurate testing during the acute period, or because of waning antibody levels or false-negative antibody testing during follow up.

Multiorgan System Effects of COVID-19

Multiorgan effects of COVID-19 have been documented in most, if not all, body systems including cardiovascular, pulmonary, renal, dermatologic, neurologic, and psychiatric. Multisystem inflammatory syndrome (MIS) and autoimmune conditions can also occur after COVID-19. A wide variety of health effects can persist after the acute illness has resolved (e.g., pulmonary fibrosis, myocarditis). It is unknown how long multiorgan system effects might last and whether or not the effects could lead to chronic health conditions.
Longer effects of COVID-19 Treatment or Hospitalization

The post-COVID conditions also can include the effects of COVID-19 treatment or hospitalization, for example tracheal stenosis from prolonged intubation, severe weakness, and deconditioning. Some of these effects are similar to those from hospitalization for other respiratory infections or other conditions. This category can also encompass post-intensive care syndrome (PICS), which includes a range of health effects that remain after a critical illness. These effects can include severe weakness and post-traumatic stress disorder. Though the effects of hospitalization may not be unique to COVID-19 illness, they are considered post-COVID conditions if they occur after a documented SARS-CoV-2 infection and persist for more than four weeks.

Long COVID

Long COVID encompasses a wide range of symptoms and clinical findings that can occur in people with varying degrees of illness from acute SARS-CoV-2 infection, including patients who had mild or asymptomatic SARS-CoV-2 infection. Patient advocacy groups often refer to this condition as long COVID. Many of the symptoms and clinical findings reported to be associated with long COVID-19 are described below. These effects can overlap with multiorgan complications, or with effects of treatment or hospitalization. This category is heterogeneous and will likely be modified in the future, as it can include patients who have clinically important but poorly understood symptoms that can be persistent or intermittent after initial acute infection with SARS-CoV-2.

Clinicians and researchers are still in the early stages of understanding long COVID. Ways in which SARS-CoV-2 infection leads to reported symptoms are still being evaluated. To date, the most commonly reported persisting symptoms include:

- Fatigue
- Difficulty thinking or concentrating (sometimes referred to as “brain fog”)
- Difficulty breathing (with and without abnormal imaging and pulmonary function testing)
- Cough
- Painful joints or muscles
- Chest pain
- Depression or anxiety
- Headache
- Fever
- Palpitations
- Loss of smell or taste
- Dizziness on standing

Post-exertional malaise (PEM), a worsening of symptoms after physical or mental activities, has been reported in patient-led surveys.

Research on Post-COVID Conditions

The natural history of SARS-CoV-2 infection is currently being investigated. Researchers are actively studying the prevalence, mechanism, duration, and severity of symptoms following acute SARS-CoV-2 infection, as well as risk factors associated with post-COVID conditions. Whereas older patients and those with underlying health conditions might have an increased risk for severe disease, young people, including those who were physically fit before SARS-CoV-2 infection, have also reported symptoms lasting several months after acute illness.

Post-acute COVID care clinics are being established at medical centers across the United States, bringing together multidisciplinary teams to provide a comprehensive and coordinated treatment approach to COVID-19 aftercare. Survivor support groups are connecting people, providing support, and sharing resources with survivors and others affected by COVID-19. Multi-year studies will be crucial in elucidating post-COVID conditions.

CDC continues active investigation into the full spectrum of COVID-19 illness, from the acute phase to longer term effects and conditions. This work will help to establish a more complete understanding of the natural history of SARS-CoV-2 infection and COVID-19 related illnesses, which can inform healthcare strategies, clinical decision-making, and the public health response to
this virus.

### References


3. Global COVID-19 Clinical Platform Case Report Form (CRF) for Post COVID condition (Post COVID-19 CRF) (who.int)


Evaluating and Caring for Patients with Post-COVID Conditions: Interim Guidance

This content is a more detailed version of the Post-COVID Conditions: Information for Healthcare Providers page. This page is also distinct from the Post-COVID Conditions webpage which is intended for the general public.

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- Key Points
- Assessment and Testing
- Background
- Management of Post-COVID Conditions
- General Clinical Considerations
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- Future Directions and Resources

Key Points

- The term “Post-COVID Conditions” is an umbrella term for the wide range of physical and mental health consequences experienced by some patients that are present four or more weeks after SARS-CoV-2 infection, including by patients who had initial mild or asymptomatic acute infection.
- Based on current information, many post-COVID conditions can be managed by primary care providers, with the incorporation of patient-centered approaches to optimize the quality of life and function in affected patients.
- Objective laboratory or imaging findings should not be used as the only measure or assessment of a patient's well-being; lack of laboratory or imaging abnormalities does not invalidate the existence, severity, or importance of a patient's symptoms or conditions.
- Healthcare professionals and patients are encouraged to set achievable goals through shared decision-making and to approach treatment by focusing on specific symptoms (e.g., headache) or conditions (e.g., dysautonomia); a comprehensive management plan focusing on improving physical, mental, and social wellbeing may be helpful for some patients.
- Understanding of post-COVID conditions remains incomplete and guidance for healthcare professionals will likely change over time as the evidence evolves.
For some patients, recovery from acute SARS-CoV-2 infection may involve continuing, recurrent, or new symptoms and clinical findings that persist for weeks, months, or longer. The term “Post-COVID Conditions,” sometimes referred to colloquially as “Long COVID,” has been proposed as an umbrella term for the wide range of physical and mental health consequences that are present four or more weeks after SARS-CoV-2 infection. These consequences include both general complications of prolonged illness as well as hospitalization and post-acute sequelae of SARS-CoV-2 infection (PASC), which are more specific to effects of SARS-CoV-2 infection. Persistent symptoms and late sequelae have also been reported among people who were determined to have had asymptomatic infection or who experienced mild acute illness.

At present, robust longitudinal surveillance data on post-COVID conditions are lacking and the prevalence is challenging to estimate. The frequency of long-term symptoms and conditions following SARS-CoV-2 infection varies widely in the literature, ranging from 5% to 80%. It has been challenging to create a single universal case definition for post-COVID conditions because studies differ in terms of the symptoms or conditions investigated, the temporal criteria used (three weeks up to many months following SARS-CoV-2 infection), the study settings included (outpatient vs. inpatient), and how symptoms and conditions are assessed (e.g., self-report vs. electronic health record database). Post-COVID conditions have been more commonly reported in women, although it is unknown whether there are biological risk factors for some post-COVID conditions and demographic differences remain unclear. Evidence suggests that post-COVID conditions occur in children and adolescents as well as adults, but the true frequency and severity are unknown. Patients with certain characteristics or comorbidities might be at higher risk for post-COVID conditions, although subpopulation prevalence information is limited. Although older patients may have an increased risk for severe acute disease and related ongoing symptoms, younger patients, including those in good health before SARS-CoV-2 infection, have also reported debilitating post-COVID conditions months after acute illness.

Post-COVID conditions are heterogenous and may be attributable to different underlying pathophysiologic processes. Efforts are underway to characterize and differentiate the multiple possible etiologies (for example, organ damage resulting from acute phase infection, complications from a persistent hyperinflammatory state, ongoing viral activity associated with an intra-host viral reservoir, inadequate antibody response, and other potential causes). Factors that may further complicate the presentation of post-COVID conditions include physical deconditioning at baseline or after a prolonged acute disease course that can be nonspecific to COVID-19, pre-COVID comorbidities (underlying medical conditions), or other physical and mental health consequences of a potentially life-threatening illness with a long or complicated disease course, as well as lifestyle changes due to the COVID-19 pandemic.

Multiple possible onset patterns for post-COVID conditions have been identified that further exemplify their heterogeneity, including, but not limited to: (A) persistent symptoms and conditions that begin at the time of acute COVID-19 illness; (B) new-onset late sequelae following asymptomatic disease or a period of acute symptom relief or remission; or (C) an evolution of symptoms and conditions that include some persistent symptoms (e.g., shortness of breath) with the addition of new symptoms or conditions over time (e.g., cognitive difficulties). Some presentations may share similarities with other post-viral syndromes, such as myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), dysautonomia (e.g., postural orthostatic tachycardia syndrome [POTS]), or mast cell activation syndrome (MCAS). Some of these types of conditions were also reported in patients who recovered from severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), two other life-threatening illnesses resulting from coronavirus infections.
Post-COVID conditions are associated with a spectrum of physical, social, and psychological consequences, as well as functional limitations that can present substantial challenges to patient wellness and quality of life.\cite{1,4,20} To inform the interim clinical guidance presented here, the Centers for Disease Control and Prevention (CDC) obtained individual expert perspectives on the evaluation and management of post-COVID conditions. CDC coordinated discussions during March and April 2021 with thirteen U.S. medical professionals with expertise in a range of clinical specialties who care for patients with post-COVID conditions, including:

- Adult and Pediatric Pulmonary Medicine
- Critical Care Medicine
- Infectious Diseases
- Physical Medicine and Rehabilitation
- Neurology
- Psychiatry
- Rheumatology
- Nephrology
- Hematology
- Cardiology

The CDC obtained additional feedback from medical organizations and patient advocacy groups. The information in this interim guidance is based on individual medical expert opinion and the best currently available data. With extensive research underway, evidence-based treatment practices will continue to evolve.

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References

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General considerations for follow-up care from hospital admission

For patients who were hospitalized for COVID-19, follow-up visits should be arranged in accordance with general standard practice, optimally within 1–2 weeks of hospital discharge. The visit should include medication reconciliation, discussion of the clinical course prior to, during, and after the hospitalization, and a comprehensive physical examination. Healthcare professionals should consider additional evaluation for other specific illnesses as indicated, such as impaired renal function, critical illness myopathy and polyneuropathy, residual cardiac or pulmonary manifestations, and psychiatric sequelae (e.g., post-traumatic stress disorder [PTSD]), among other possible conditions, particularly among patients admitted to the intensive care unit (ICU). Approaches to evaluating and managing post-intensive care syndrome (PICS), including consultation with physiatry, may be helpful for patients who experience physical, cognitive, and mental health challenges following an ICU stay for COVID-19.[21]

Healthcare professionals should consider additional follow-up visits as indicated by on-going need. Studies suggest that approximately 9–15% of patients who were hospitalized with COVID-19 are readmitted within two months of discharge, and nearly 30% are readmitted within six months of discharge, underscoring the need for close follow-up in the months after initial hospital discharge, whether for post-COVID conditions or for other health concerns.[22-24] Reasons for hospital readmission in these patients have included respiratory distress, sepsis, pneumonia, heart failure, thrombotic episodes, psychiatric illness, and falls, among other causes.[25, 26] Risk factors for readmission have included older age, certain underlying conditions (e.g., chronic obstructive pulmonary disease, hypertension), shorter initial length of stay, and lower rates of in-hospital treatment-dose anticoagulation.[27, 28] Resources are available for up-to-date information concerning COVID-19-associated hypercoagulability, including management of anticoagulation.[29, 30]

General considerations for follow-up care for asymptomatic acute SARS-CoV-2 infection or mild-to-moderate acute COVID-19 treated in an outpatient setting

Some patients who were asymptomatic or mildly to moderately ill with COVID-19 may develop new, continued, or worsening symptoms and conditions following their acute infection. A workup can be conducted to establish history of COVID-19 based on earlier clinical illness and antibody testing, recognizing that persons with COVID-19 can have asymptomatic infection and that among persons with diagnosed SARS-CoV-2 as many as 10-20%[29, 30] may have no detectable antibodies (see the Assessment and Testing section).

Patients with asymptomatic infection to moderate illness might benefit from follow-up within 3–4 weeks from initial infection if they experience ongoing or new symptoms. For children or adolescents, many of whom have had asymptomatic to mild infection, the American Academy of Pediatrics (AAP) has developed interim guidance on return to physical activity/sports that recommends an in-person examination by a pediatrician regardless of the severity of the acute infection.[31]
General post-COVID care considerations

Many post-COVID conditions can be diagnosed clinically based on history and findings on physical examination. Others might require directed diagnostic testing with the understanding that such clinical assessments may be uninformative and that potential harms could arise from excessive testing such as the increased risk for incidental findings, anxiety about abnormal results that do not have clinical significance, imaging-related radiation exposure, and cost. For most patients with possible post-COVID conditions, healthcare professionals might choose a conservative diagnostic approach in the first 4 to 12 weeks following SARS-CoV-2 infection. Laboratory and imaging studies can often be normal or nondiagnostic in patients experiencing post-COVID conditions and symptoms may improve or resolve during the first few months after acute infection in some patients, further supporting an initial conservative approach to diagnostic testing. However, workup and testing should not be delayed when there are signs and symptoms of urgent and potentially life-threatening clinical conditions (e.g., pulmonary embolism, myocardial infarction, pericarditis with effusion, stroke, renal failure). Symptoms that persist beyond three months should prompt further evaluation.

Most post-COVID conditions can be diagnosed and managed by primary care providers, and a patient-centered medical home model could be helpful, with coordinated comprehensive care and open communication among a core group of specialty care providers and support services (e.g., occupational therapy, physical therapy, social work) to maximize functional improvement and rehabilitation efforts. Healthcare professionals may also consider referral to multidisciplinary post-COVID care centers, where available, for additional care considerations. Multidisciplinary post-COVID care centers based in a single physical location can provide a comprehensive and coordinated treatment approach to COVID-19 aftercare. Based on clinical evaluation and response to treatment, healthcare professionals might consider using a stepwise approach to other specialist referrals. Healthcare professionals should be mindful of the additional burden (e.g., financial, time, and psychological burden) multiple specialist visits may place on patients and the possibility of fragmented care that can increase the risk of contradictory medical advice.

Approaches that incorporate telemedicine, including phone calls and virtual visits, can be helpful for ongoing follow-up and might lessen the burden on patients with limited energy from post-COVID conditions or who have other concerns about in-person visits. Although an in-person initial assessment might be ideal, under some circumstances it may not be possible. Evaluation and care should not be delayed if only telemedicine options are available.

Effective post-COVID care might include:

- Providing holistic patient-centered management approaches to improve patient quality of life and function and partnering with patients to identify achievable health goals.
- Facilitating standardized, trauma-informed approaches to assessing symptoms and conditions.
- Setting expectations with patients and their families that outcomes from post-COVID conditions differ among patients. Some patients may experience symptom improvement within the first three months, whereas others may continue to experience prolonged symptoms.
- Continuing follow-up over the course of illness, with considerations of broadening the testing and management approach over time if symptoms do not improve or resolve, while remaining transparent that there is much more to learn about post-COVID conditions.
- Establishing partnerships with specialists for physical and mental health care, when needed, which may include comprehensive rehabilitation services.
- Connecting patients to social services when available, including assistance for other hardships (e.g., financial, family illness, bereavement, caregiving) and resources on disability and reasonable accommodations for work or school, and connections to patient support groups.

Overall, it is important for healthcare professionals to listen to and validate patients' experiences, recognizing that diagnostic testing results may be within normal ranges even for patients whose symptoms and conditions negatively impact their quality of life, functioning (e.g., with activities of daily living), and ability to return to school or work.

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A Suggested Workup for Post–COVID Conditions

Patient history

The history of present illness should include the patient’s COVID-19 disease course, severity of illness, and treatments received. When possible, healthcare professionals should establish a timeline of when symptoms emerged during acute illness and afterwards. Commonly reported symptoms are included in Table 1.\(^1\)\(^-\)\(^4\),\(^6\)-\(^9\),\(^12\),\(^20\),\(^39\)-\(^46\)

Table 1. Symptoms commonly reported among people with post-COVID conditions

<table>
<thead>
<tr>
<th>Symptom</th>
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<tbody>
<tr>
<td>Dyspnea or increased respiratory effort</td>
</tr>
<tr>
<td>Fatigue</td>
</tr>
<tr>
<td>Post-exertional malaise and/or poor endurance</td>
</tr>
<tr>
<td>“Brain fog,” cognitive impairment</td>
</tr>
<tr>
<td>Cough</td>
</tr>
<tr>
<td>Chest pain</td>
</tr>
<tr>
<td>Headache</td>
</tr>
<tr>
<td>Palpitations and/or tachycardia</td>
</tr>
<tr>
<td>Arthralgia</td>
</tr>
<tr>
<td>Myalgia</td>
</tr>
<tr>
<td>Paresthesia</td>
</tr>
<tr>
<td>Abdominal pain</td>
</tr>
<tr>
<td>Diarrhea</td>
</tr>
<tr>
<td>Insomnia and other sleep difficulties</td>
</tr>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Lightheadedness</td>
</tr>
<tr>
<td>Impaired daily function and mobility</td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Rash (e.g., urticaria)</td>
</tr>
<tr>
<td>Mood changes</td>
</tr>
<tr>
<td>Anosmia or dysgeusia</td>
</tr>
<tr>
<td>Menstrual cycle irregularities</td>
</tr>
</tbody>
</table>

* Post-exertional malaise (PEM) is the worsening of symptoms following even minor physical or mental exertion, with symptoms typically worsening 12 to 48 hours after activity and lasting for days or even weeks.

The broad spectrum of signs and symptoms reported thus far in persons with post-COVID conditions warrants a broad approach to the review of systems. Since information on post-COVID conditions in children and adolescents is limited, it is possible that other signs and symptoms than those listed in Table 1 may be present or more common in younger age groups. Both for children and adults, healthcare providers should elicit the frequency, severity, and evolution of symptoms and their impact on quality of life and functional ability, including the degree to which symptoms interfere with their ability to return to school or work.
Past medical history should include assessment for prior conditions that could impact the severity of COVID-19 disease, including but not limited to asthma, allergies, chronic obstructive pulmonary disease, interstitial lung disease, chronic kidney disease, diabetes mellitus, obesity, sleep disorders, prior autoimmune disease, mood disorders (e.g., anxiety or depression), trauma and stressor-related disorders (e.g., adjustment disorder or PTSD), hypertension, migraines, fibromyalgia, or chronic fatigue.

Social history should include assessment of the level of material and social supports and resources available to the patient (e.g., finances, employment, housing, access to food) and their potential impact on the capacity of patients to access health and recuperation services. Healthcare professionals should establish the patient's current and pre-infection level of activity (e.g., nature of work or school activities, activities of daily living) as well as screen for potential or known substance use disorder. The Centers for Medicare and Medicaid Services provide a useful tool for assessing these and other social needs and determinants of health.

For patients with clinical features warranting further evaluation, healthcare professionals might consider the broad range of possible post-COVID conditions. These could have been present prior to and unmasked by SARS-CoV-2 infection or they may have been caused more directly by SARS-CoV-2 infection. Additional system-based conditions that have been reported following SARS-CoV-2 infection can be found in Table 2. (1-3, 6, 39, 40, 46, 47)

### Table 2. System-based conditions reported following SARS-CoV2 infection

<table>
<thead>
<tr>
<th>Body System</th>
<th>Conditions (subject to change and not mutually exclusive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>Myocarditis, heart failure, pericarditis, orthostatic intolerance (e.g., postural orthostatic tachycardia syndrome (POTS))</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Interstitial lung disease, reactive airway disease</td>
</tr>
<tr>
<td>Renal</td>
<td>Chronic kidney disease</td>
</tr>
<tr>
<td>Dermatologic</td>
<td>Alopecia</td>
</tr>
<tr>
<td>Rheumatologic</td>
<td>Reactive arthritis, fibromyalgia, connective tissue disease</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Diabetes mellitus, hypothyroidism</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Transient ischemic attack/stroke, olfactory and gustatory dysfunction, sleep dysregulation, altered cognition, memory impairment, headache, weakness, and neuropathy</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>Depression, anxiety, and post-traumatic stress disorder (PTSD), psychosis</td>
</tr>
<tr>
<td>Hematologic</td>
<td>Pulmonary embolism, arterial thrombosis, venous thromboembolism, or other hypercoagulability</td>
</tr>
<tr>
<td>Urologic</td>
<td>Incontinence, sexual dysfunction</td>
</tr>
<tr>
<td>Other</td>
<td>Weight loss, dysautonomia, vitamin D deficiency, allergies and mast cell activation syndrome, reactivation of other viruses, pain syndromes, and progression of comorbid conditions</td>
</tr>
</tbody>
</table>

As more is learned about the natural history of SARS-CoV-2 infection, this list of symptoms and conditions will likely change over time.

**Physical examination and vital signs**
Post-COVID conditions involve multiple organ systems, thus a thorough physical examination should be completed. For patients who report previous infection with SARS-CoV-2, in addition to standard vital signs (i.e., blood pressure, heart rate, respiratory rate, pulse-oximetry, body temperature) and body mass index, healthcare professionals should evaluate ambulatory pulse-oximetry for individuals presenting with respiratory symptoms, fatigue, or malaise. Orthostatic vital signs should be evaluated for individuals reporting postural symptoms, dizziness, fatigue, cognitive impairment, or malaise.

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Last Updated June 14, 2021
Laboratory Testing

At this time, no laboratory test can definitively distinguish post-COVID conditions from other etiologies, in part due to the heterogeneity of post-COVID conditions. A positive SARS-CoV-2 viral test (i.e., reverse transcription polymerase chain reaction [RT-PCR] test or antigen test) or serologic (antibody) test can help assess for current or previous infection; however, these laboratory tests are not required to establish a diagnosis of post-COVID conditions. SARS-CoV-2 RT-PCR and antigen testing are not 100% sensitive. Further, testing capacity was limited early in the pandemic so that some infected and recovered persons had no opportunity to obtain laboratory confirmation of SARS-CoV-2 infection. For information about antibody testing, see “Using Antibody Tests for COVID-19.” Healthcare professionals should also consider the possibility of SARS-CoV-2 reinfection, especially in persons with new or worsening post-COVID conditions, see “Guidance for SARS-CoV-2 Reinfection.”

Before ordering laboratory testing for post-COVID conditions, the goals of testing should be clear to the healthcare professional and to the patient. Laboratory testing should be guided by the patient history, physical examination, and clinical findings. A basic panel of laboratory tests might be considered for patients with ongoing symptoms (including testing for non-COVID conditions that may be contributing to illness) to assess for conditions that may respond to treatment, until more information and evidence is available for specific laboratory testing for post-COVID conditions (Table 3a). More specialized testing may not be needed in patients who are being initially evaluated for post-COVID conditions; however, expanded testing should be considered if symptoms persist for 12 weeks or longer (Table 3b). The absence of laboratory-confirmed abnormalities or the decision to forgo extensive laboratory testing should not lead to dismissing the possible impact of a patient’s symptoms on their daily function. Where clinically indicated, symptom management and a comprehensive rehabilitation plan can be initiated simultaneously with laboratory testing for most patients.

Table 3a. Basic diagnostic laboratory testing to consider for patients with post-COVID conditions

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>LAB TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood count, electrolytes, and renal function</td>
<td>Complete blood count with possible iron studies to follow, basic metabolic panel, urinalysis</td>
</tr>
<tr>
<td>Liver function</td>
<td>Liver function tests or complete metabolic panel</td>
</tr>
<tr>
<td>Inflammatory markers</td>
<td>C-reactive protein, erythrocyte sedimentation rate, ferritin</td>
</tr>
<tr>
<td>Thyroid function</td>
<td>TSH and free T4</td>
</tr>
</tbody>
</table>
Other assessment and testing

Symptom inventories and assessment tools, such as those embedded within electronic health records, can help evaluate and monitor the status of post-COVID conditions. Functional testing can also be helpful to quantitatively document clinical status over time. A selection of some available assessment tools is shown in Table 4a and Table 4b. These and other measures can also be found in the health measures toolbox and American Academy of Physical Medicine & Rehabilitation's functional assessments, along with assessment tools for other rehabilitation needs (e.g., bowel and bladder function, pain, activities of daily living, cognition, mobility, sleep). Testing should be tailored to the patient's symptoms and presentation.

Table 3b. More specialized diagnostic laboratory testing to consider for patients with post-COVID conditions

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>LAB TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatological conditions</td>
<td>Antinuclear antibody, rheumatoid factor, anti-cyclic citrullinated peptide, anti-cardiolipin, and creatine phosphokinase</td>
</tr>
<tr>
<td>Coagulation disorders</td>
<td>D-dimer, fibrinogen</td>
</tr>
<tr>
<td>Myocardial injury</td>
<td>Troponin</td>
</tr>
<tr>
<td>Differentiate symptoms of cardiac versus pulmonary origin</td>
<td>B-type natriuretic peptide</td>
</tr>
</tbody>
</table>

* The specialized diagnostic tests should be ordered in the context of suggestive findings on history and physical examination (e.g., testing for rheumatological conditions in patients experiencing arthralgias).

Table 4a. Selected assessment tools for evaluating people with post-COVID conditions

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TOOLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional status and/or quality of life</td>
<td>Patient-Reported Outcomes Measurement Information System (PROMIS) (e.g., Cognitive Function 4a)</td>
</tr>
<tr>
<td></td>
<td>Post-Covid-19 Functional Status Scale (PCFS)</td>
</tr>
<tr>
<td></td>
<td>EuroQol-5D (EQ-5D)</td>
</tr>
<tr>
<td>Respiratory conditions</td>
<td>Modified Medical Research Council Dyspnea Scale (mMRC)</td>
</tr>
<tr>
<td>Neurologic conditions</td>
<td>Montreal Cognitive Assessment (MoCA)</td>
</tr>
<tr>
<td></td>
<td>Mini Mental Status Examination (MMSE)</td>
</tr>
<tr>
<td></td>
<td>Compass 31 (for dysautonomia)</td>
</tr>
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</table>
### Neurobehavioral Symptom Inventory

**Psychiatric conditions**
- General Anxiety Disorder-7 (GAD-7)
- Patient Health Questionnaire-9 (PHQ-9)
- PTSD Symptom Scale (PSS)
- Screen for Posttraumatic Stress Symptoms (SPTSS)
- PTSD Checklist for DSM-5 (PCL-5)
- Impact of Event Scale-Revised (IESR)
- Hospital Anxiety and Depression Scale (HADS)

**Other conditions**
- Wood Mental Fatigue Inventory (WMFI)
- Fatigue Severity Scale
- Insomnia Severity Index (ISI)
- Connective Tissue Disease Screening Questionnaire

### Table 4b. Selected functional and other testing tools for evaluating people with post-COVID conditions

<table>
<thead>
<tr>
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<tr>
<td></td>
<td>1-minute sit-to-stand test</td>
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<tr>
<td><strong>Other</strong></td>
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<tr>
<td></td>
<td>Tilt-table testing (e.g., for POTS)</td>
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<td>Orthostatic HR assessment</td>
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Healthcare professionals should use caution when conducting exercise capacity testing in some patients, especially those with post-exertional malaise (i.e., the worsening of symptoms following even minor physical or mental exertion, with symptoms typically worsening 12 to 48 hours after activity and lasting for days or even weeks). For these patients and others who may not have the stamina for extended or lengthy assessments, modifications in the testing plan may also be needed. Exercise capacity tests should be scheduled for a dedicated follow-up appointment so that patients can prepare additional home supports. Ensuring that the testing circumstances best support the patient to perform maximally and then documenting this performance can create an objective reliable record of functional status that may be needed for assessment for other services or disability.

Additional diagnostic testing should be guided by findings from the patient history and physical examination and results of previous diagnostic testing, and may include a chest x-ray, pulmonary function tests, electrocardiogram, or echocardiogram for persistent or new respiratory or cardiac concerns, although more evidence is needed to support the utility of specific imaging tests for evaluation of post-COVID conditions. For patients who may require imaging based on clinical findings, symptom management and a rehabilitation plan can often be initiated simultaneously with the imaging workup. In patients with normal chest x-rays and normal oxygen saturation, computed tomography (CT) imaging of the chest might have lower yield for assessing pulmonary disease. In patients without an elevated D-dimer and compatible symptoms, CT pulmonary angiogram may be lower yield in the context of a pulmonary embolism workup. In patients with brain fog symptoms, magnetic resonance imaging (MRI) of the brain might not be revealing for pathologic findings in the absence of focal neurological deficits. Further caution may be exercised in ordering imaging in children without a high index of suspicion of pathology. More specialized (e.g., cardiac MRI) imaging studies might merit consultation with specialists.

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Medical Management

For most patients, the goal of medical management of post-COVID conditions is to optimize function and quality of life. Ideally, healthcare professionals, in consultation with the appropriate specialists, should develop a comprehensive management plan based on their patients’ presenting symptoms, underlying medical and psychiatric conditions, personal and social situations, and their treatment goals. Setting achievable goals through shared decision-making can be beneficial. Transparency is important for the process of goal setting: healthcare professionals should advise patients that post-COVID conditions are not yet well understood, and assure them that support will continue to be provided as new information emerges. Healthcare professionals and patients should continue to discuss progress and challenges and reassess goals as needed. Symptoms not explained by, or out of proportion to, objective findings are not uncommon after COVID-19 and should not be dismissed even if there is not yet a full understanding of their etiology or their expected duration.

Many post-COVID conditions can be improved through already established symptom management approaches (e.g., breathing exercises to improve symptoms of dyspnea). Creating a comprehensive rehabilitation plan may be helpful for some patients and might include physical and occupational therapy, speech and language therapy, vocational therapy, as well as neurologic rehabilitation for cognitive symptoms. A conservative physical rehabilitation plan might be indicated for some patients (e.g., persons with post-exertional malaise); consultation with physiatry for cautious initiation of exercise and recommendations about pacing may be useful. Gradual return to exercise as tolerated could be helpful for most patients. Optimizing management of underlying medical conditions might include counseling on lifestyle components such as nutrition, sleep, and stress reduction (e.g., meditation).

Patient diaries and calendars might be useful to document changes in health conditions and symptom severity, especially in relation to potential triggers such as exertion (physical and cognitive), foods, menstruation, and treatments or medications. Such diaries and calendars can provide greater insight into patients’ symptoms and lived experience for healthcare professionals. Healthcare professionals should encourage patients to report any new or changing symptoms and to discuss any changes in activities or routines.

Patients with post-COVID conditions may share some of the symptoms that occur in patients who experience myalgic encephalomyelitis/chronic fatigue syndrome, fibromyalgia, post-treatment Lyme disease syndrome, dysautonomia, and mast cell activation syndrome. Symptom management approaches that have been helpful for these disorders may also benefit some patients with post-COVID conditions (e.g., activity management (pacing) for post-exertional malaise).

FDA-approved or over the counter medications as well as vitamin or electrolyte supplements may be helpful for indicated illnesses (e.g., headache, anxiety) or documented deficiencies (e.g., vitamin deficiency) after carefully weighing the benefits and risks of pharmaceutical interventions. Some treatments have been offered that lack evidence of efficacy or effectiveness, and could be harmful to patients. Healthcare professionals should inquire about any unprescribed medications, herbal remedies, supplements, or other treatments that patients may be taking for their post-COVID conditions.

Follow-up visits with a healthcare professional might be considered every 2–3 months, with frequency adjusted up or down depending on the patient’s condition and illness progression.
Holistic Support for Patients with Post–COVID Conditions

Evidence indicates that holistic support for the patient throughout their illness course can be beneficial. Recognizing and validating the impact of illness on quality of life should be part of the ongoing healthcare professional and patient interaction. Healthcare professionals can provide information on peer support resources (e.g., patient support groups, online forums). Support groups are connecting individuals, providing support, and sharing resources for persons affected by COVID-19 (see Resources). When material, employment or other social support needs are identified, healthcare professionals should consider referral themselves (if they are knowledgeable and able) and engaging a social worker, case worker, community health worker, or similarly trained professional to assist.

Patient Groups with Special Considerations

Persons who belong to racial and ethnic minority populations have experienced a higher burden of COVID-19 in part because of structural racism and longstanding disparities in social determinants of health, which could reasonably lead to a higher incidence of post-COVID conditions in these same populations. COVID-19-related health disparities have also been reported for racial and ethnic minority employees of certain occupations (e.g., working in meat processing facilities). Deploying resources to these communities can help ensure disproportionately affected residents are aware of post-COVID conditions and have access to needed services that may be lacking there.

People with disabilities may require close follow-up related to functional limitations. People experiencing homelessness or housing instability as well as people in correctional facilities may experience challenges accessing healthcare and other support services. People with pre-existing substance use disorder may be at risk for relapse.

Tools for cross-cultural communication and language access, including translated materials on post-COVID conditions and interpreter services, could help address health literacy and improve communication effectiveness.

People with barriers to accessing health care due to lack of health insurance, access to healthcare professionals who accept their health insurance, or lack of transportation, childcare, or paid sick leave may face additional challenges accessing healthcare. Telemedicine visits may be helpful for such patients who live in rural areas with access to broadband.

Lastly, patient advocacy groups have raised concerns that some post-COVID conditions have been either misdiagnosed as or misattributed to psychiatric causes, particularly among persons who belong to marginalized or vulnerable groups. Sensitivity to and awareness of stigma, completing a full clinical evaluation, and maintaining an attitude of empathy and understanding can help address these concerns.

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Public Health Recommendations
Evaluating and Caring for Patients with Post-COVID Conditions: Interim Guidance
Updated June 14, 2021

Documentation of SARS-CoV-2 infection and post-COVID conditions is critical for accurate public health surveillance. The World Health Organization (WHO) has developed coding guidance for health care encounters related to post-COVID conditions based on the International Classification of Diseases, Tenth Edition Clinical Modification (ICD-10-CM). WHO has recommended the following ICD-10 code be used:

- **U09.9 Post COVID-19 condition, unspecified** – to allow the establishment of a link with COVID-19; not to be used in cases that still are presenting with acute COVID-19

The ICD-10 code **U09.9 Post COVID-19 condition** code is not currently available in the United States and is under review by the U.S. ICD-10 Coordination and Maintenance Committee. In the meantime, CDC recommends the following ICD-10-CM code be used for post-COVID conditions:

- **B94.8 Sequelae of other specified infectious and parasitic diseases**

**Public Health Recommendations**

People with post-COVID conditions should continue to follow CDC's recommended COVID-19 prevention measures, including wearing a mask when and where indicated, maintaining the appropriate physical distance from people who are not from their household, avoiding crowds and poorly ventilated indoor spaces, washing hands, and when vaccinated following the general recommendations for vaccinated people.

**COVID-19 Vaccination and Other Vaccinations**

COVID-19 vaccination should be offered to all eligible people, regardless of their history of SARS-CoV-2 infection. Although anecdotal reports indicate that some patients with post-COVID conditions have experienced improvements in their symptoms after COVID-19 vaccination, research is ongoing to establish the extent of this effect, if verified. Healthcare professionals should also emphasize the importance of annual vaccination against influenza for all people aged ≥6 months, including patients with a history of COVID-19. In addition, vaccination against pneumococcal disease should be considered according to current ACIP guidelines.

During the pandemic, fewer routine childhood vaccine doses were administered leaving children at risk for vaccine-preventable diseases. Healthcare professionals should work with families to keep children and adolescents up to date with well-child visits and all recommended vaccinations, including children and adolescents experiencing post-COVID conditions. For more information on immunization services and vaccination recommendations during the pandemic, visit “Vaccination Guidance.” Developmental surveillance and early childhood screenings, including developmental and autism screening, should continue along with referrals for early intervention services, and further evaluation if concerns are identified.

**Preventive Care**
Patients with post-COVID conditions might additionally benefit from a review of their current preventive care practices, including age-appropriate preventive health screenings and vaccinations that may have been delayed due to the pandemic and other discussions regarding nutrition, physical activity, sleep, stress management, interpersonal relationships, and chronic disease management.

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Last Updated June 14, 2021
Future Directions

Research is underway to define the post-acute and long-term phases of COVID-19, and to distinguish health effects exclusively related to infection with SARS-CoV-2 from consequences of hospitalization, and from medical procedures and treatments required for care of people with severe disease of any etiology (e.g., post-intensive care syndrome). The natural history of SARS-CoV-2 infection and COVID-19-related illnesses is a current area of investigation, and the prevalence, type, duration, and severity of persistent symptoms following resolution of acute SARS-CoV-2 infection, as well as risk factors associated with their development, continue to be studied. CDC has also partnered with the National Institute of Health (NIH), aligning efforts within the federal government to support the PASC initiative.

Knowledge of post-COVID conditions is likely to change rapidly with ongoing research. Healthcare professionals and patients should continue to check for updates on evolving guidance for post-COVID conditions. CDC will continue to work in collaboration with federal, state, local, academic, and community partners to better understand the long-term effects of SARS-CoV-2 infection, and this guidance will be updated as new information emerges.

Resources

Support Groups

- Body Politic
- Survivor Corps
- Long COVID Alliance
- Long COVID Kids

Symptom and Condition Assessments

- Measuring orthostatic blood pressure
- Health measures toolbox
- AAPM&R functional assessments

Other Tools and Resources

- The Accountable Health Communities Health-Related Social Needs Screening Tool
- Tools for providing trauma-informed care
- Tools for cross-cultural communication
- AAPM&R Long COVID (PASC) resources
- AAFP Social Determinants of Health resources
## Acknowledgements

- CDC COVID-19 Response's Post-COVID Conditions Unit
- **External Post-COVID Condition Experts:** Kathleen Bell MD, Jean Marie Connors MD, Jill Foster MD, Dixie Harris MD, Jonathan Himmelfarb MD, Judith James MD PhD, Nomi Levy-Carrick MD MPhil, Mitchell Miglis MD, Allison Navis MD, Jennifer Possick MD, Wendy S. Post MD MS, Peter Rowe MD, Bazak Sharon MD

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