



Post Covid-19 Conditions

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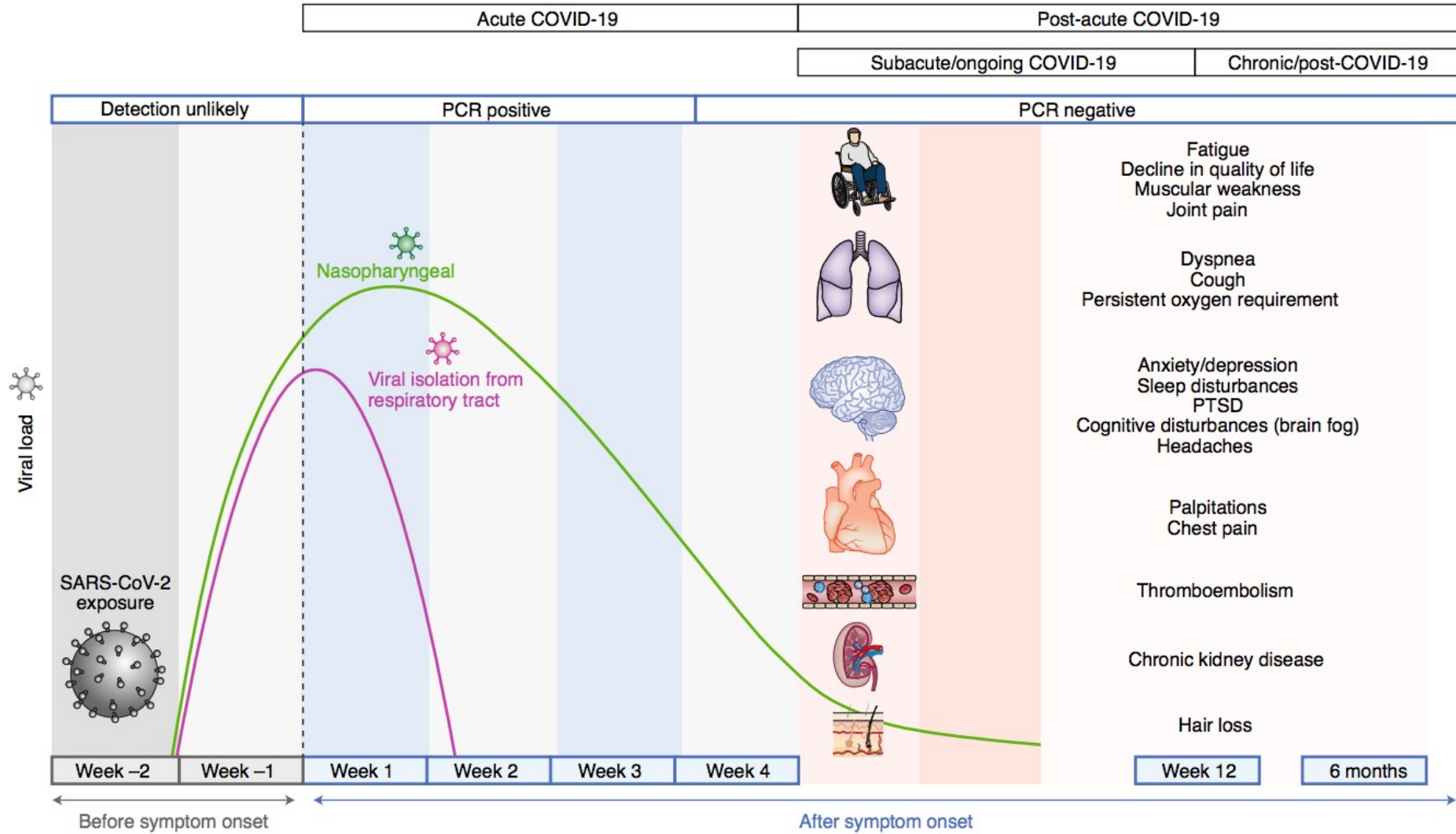
Definitions

Follow-up

- Most common symptoms
- Timing to symptom resolution

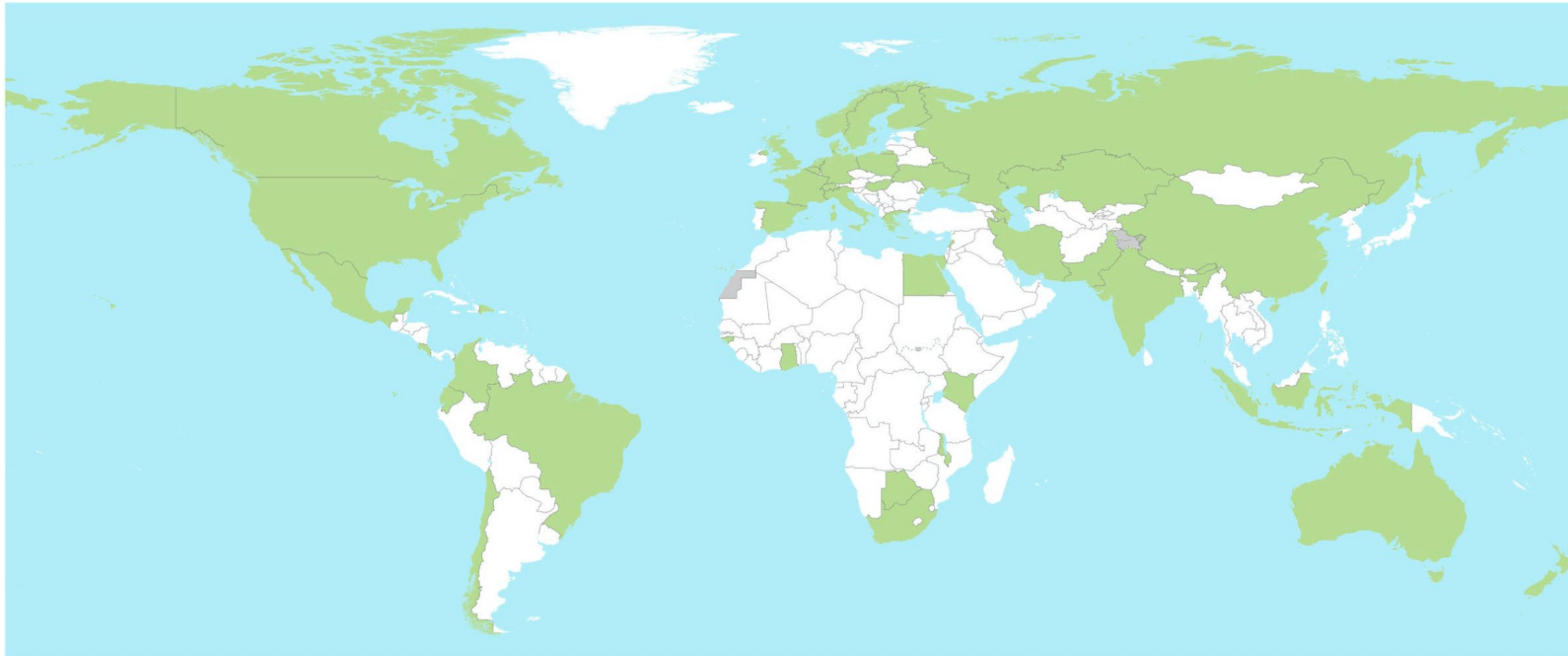
Management

- Comprehensive history and physical exam
- Laboratory Testing
- Evaluation of specific conditions



A clinical case definition of post COVID-19 condition by a Delphi consensus

Post COVID-19 Condition - Delphi participants



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Data Source: World Health Organization, DelphiManager
Map Production: WHO Health Emergencies Programme



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Demographic characteristics of participants

Variable and values	Round 1, n (%)	Round 2, n (%)
Stakeholder group		
Patient	61 (23.0)	47 (24.1)
Patient-researcher	18 (6.8)	13 (6.7)
External expert	138 (52.1)	103 (52.8)
WHO staff	33 (12.5)	22 (11.3)
Other	15 (5.7)	10 (5.1)
Gender		
Female	115 (43.4)	86 (44.1)
Male	147 (55.5)	107 (54.9)
Non-binary	1 (0.4)	0
Prefer not to say	2 (0.8)	2 (1.0)
Age band		
20 to 29 years old	16 (6.0)	11 (5.6)
30 to 39 years old	53 (20.0)	42 (21.5)
40 to 49 years old	86 (32.5)	63 (32.3)
50 to 59 years old	73 (27.5)	52 (26.7)
60 to 69 years old	32 (12.1)	22 (11.3)
70 to 79 years old	4 (1.5)	4 (2.1)
90 years or older	1 (0.4)	1 (0.5)
WHO region		
African	9 (3.4)	8 (4.1)
American	53 (20.0)	36 (18.5)
Eastern Mediterranean	7 (2.6)	4 (2.1)
European	94 (35.5)	70 (35.9)
Southeast Asian	10 (3.8)	8 (4.1)
Western Pacific	19 (7.2)	18 (9.2)
Country not specified	73 (27.5)	51 (26.2)
World Bank income group		
High income	140 (52.8)	110 (56.4)
Upper middle income	37 (14.0)	22 (11.3)
Lower middle income	13 (4.9)	10 (5.1)
Low income	2 (0.8)	2 (1.0)
Country not specified	73 (27.5)	51 (26.2)
Total	265 (100)	195 (100)

Domain number	Domain name
1	History of SARS-CoV-2 infection
2	SARS-CoV-2 laboratory confirmation
3	Minimum time period from onset of symptoms (or from date of positive test for asymptomatic) <u>3 months</u>
4	Minimum duration of symptoms <u>at least 2 months</u>
5	Symptoms and/or impairments: cognitive dysfunction, fatigue, shortness of breath, others
6	Minimum number of symptoms
7	<u>Clustering of symptoms</u>
8	Time-course nature of symptoms: (<u>fluctuating</u> , increasing, <u>new onset</u> , persistent , <u>relapsing</u>)
9	Sequelae of well-described complications of COVID-19 (stroke, heart attack, etc.)
10	Symptoms cannot be explained by an alternative diagnosis
11	Application of definition to different populations: <i>Include separate definition for children, others</i>
12	<i>Impact on everyday functioning</i>

Note: Consensus achieved in **Round 1**, in *Round 2* and after Delphi panel group discussion.

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WHO

Post COVID-19 condition occurs in individuals with a **history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis.** Common symptoms include **fatigue, shortness of breath, cognitive dysfunction** but also others, which generally have an **impact on everyday functioning.** Symptoms may be **new onset**, following initial recovery from an acute COVID-19 episode, or **persist** from the initial illness. Symptoms may also **fluctuate** or **relapse** over time. A separate definition may be applicable for children.

CDC

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

[Post-COVID Conditions: Information for Healthcare Providers \(cdc.gov\)](https://www.cdc.gov/post-covid-19/)

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- Repository of published/available definitions of post COVID-19 condition

Source	Text
Wellcome	Symptoms persisting beyond 4 weeks after symptom onset suggestive of COVID-19 (33).
Lancet	Multiorgan symptoms after COVID-19 are being reported by increasing numbers of patients. They range from cough and shortness of breath, to fatigue, headache, palpitations, chest pain, joint pain, physical limitations, depression, and insomnia, and affect people of varying ages. At the Lancet–Chinese Academy of Medical Sciences conference on 23 November 2020, Bin Cao presented data (in press at the Lancet) on the long-term consequences of COVID-19 for patients in Wuhan, and warned that dysfunctions and complications could persist in some discharged patients for at least 6 months. So-called long COVID is a burgeoning health concern and action is needed now to address it (34).
NICE	Signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis (35).
Scientific American	Individuals whose symptoms persist or develop outside the initial viral infection, but the duration and pathogenesis are unknown (36).
Royal Society	The onset of persistent or recurrent episodes of one or more of the following symptoms, within x* weeks of infection with SARS-CoV-2 and continuing for y* weeks or more: severe fatigue, reduced exercise capacity, chest pain or heaviness, fever, palpitations, cognitive impairment, anosmia or ageusia, vertigo and tinnitus, headache, peripheral neuropathy, metallic or bitter taste, skin rash joint pain or swelling (3). * Maximum period between acquisition of the infection (if known) and the onset of symptoms, and the minimum duration of symptoms, should be specified in the definition.
Haute Autorité de santé, France	Three criteria: Having presented with a symptomatic form of COVID-19; presenting with one or more initial symptoms 4 weeks after the start of the disease; and none of these symptoms can be explained by another diagnosis (37).
CDC	Long COVID: While most persons with COVID-19 recover and return to normal health, some patients can have symptoms that can last for weeks or even months after recovery from acute illness. Even people who are not hospitalized and who have mild illness can experience persistent or late symptoms (38).
Wikipedia	Condition characterized by long-term sequelae – persisting after the typical convalescence period – of coronavirus disease 2019 (COVID-19) (39).
Nature	Post-acute COVID-19 as persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection beyond 4 weeks from the onset of symptoms (40).

Characteristics of Post COVID-19 Conditions

Most people with COVID-19 get better within weeks of illness

- Some people experience post-COVID conditions

People who had asymptomatic COVID-19

- Can have post-COVID conditions

Although the accepted term today is Post COVID-19 Conditions, they may also be known as:

- Long COVID, long-haul COVID, post-acute COVID-19, long-term effects of COVID, or chronic COVID.

The short- and long-term health effects associated with COVID-19 are:

- UNKNOWN

As of July 2021, post-COVID conditions, can be considered a disability under the Americans with Disabilities Act

Types of Post COVID-19 Condition



**New or Ongoing
Symptoms**



**Multiorgan Effects of
COVID-19**



**Effects of COVID-19
Illness or Hospitalization**

New or Ongoing Symptoms

- Some people experience a range of new or ongoing symptoms that can last weeks or months after first being infected with the virus that causes COVID-19
- It may occur in people who had mild illness
- It can occur in people who were asymptomatic
- Patients commonly report experiencing different combinations of the following symptoms:

Respiratory	Physical and Mental Fatigue	Gastrointestinal	Neuro/Psychiatric	Miscellaneous
<ul style="list-style-type: none">• Difficulty breathing or shortness of breath• Cough• Chest Pain• Fast-beating or pounding heart (also known as heart palpitations)	<ul style="list-style-type: none">• Tiredness or fatigue• Symptoms that get worse after physical or mental activities (also known as post-exertional malaise)• Difficulty thinking or concentrating (sometimes referred to as “brain fog”)	<ul style="list-style-type: none">• Stomach pain• Diarrhea	<ul style="list-style-type: none">• Pins-and-needles feeling• Sleep problems• Headache• Dizziness on standing (lightheadedness)• Mood changes• Change in smell or taste	<ul style="list-style-type: none">• Fever• Joint or muscle pain• Rash• Changes in menstrual period cycles

Multiorgan Effects of COVID-19

Some people who had severe illness with COVID-19

- Experience multiorgan effects or autoimmune conditions over a longer time with symptoms lasting weeks or months after COVID-19 illness

Multiorgan effects can affect many, if not all, body systems, including:

- Heart, lung, kidney, skin, and brain functions.

While rare, some people, mostly children, experience multisystem inflammatory syndrome (MIS) during or immediately after a COVID-19 infection.

- MIS can lead to post-COVID conditions if a person continues to experience multiorgan effects or other symptoms.

Effects of COVID-19 illness or Hospitalization

Hospitalizations and severe illnesses for lung-related diseases, including COVID-19, can cause health effects like:

- Severe weakness and exhaustion during the recovery period.
- Post-intensive care syndrome (PICS):
 - Severe weakness
 - Cognitive impairment
 - PTSD

It is not known if these symptoms are caused by :

- The effects of hospitalization
- Long-term effects of the virus
- Combination of both

These conditions might also be complicated by other effects related to the COVID-19 pandemic, such as:

- Mental health effects from isolation
- Negative economic situations, and lack of access to healthcare for managing underlying conditions.

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Persistent Physical and Psychological Symptoms

Most Common Physical Symptoms (> 30 % of patients)

- **Fatigue** (15% - 87 %)
- **Dyspnea** (10% - 7%)
- **Chest pain/tightness** (12% - 44%)
- **Cough** (17% - 34%)

Persistent Symptoms and Functional Impairment

Less common symptoms include:

- Headache,
- Anosmia/dysgeusia
- Arthralgias/myalgias
- Dizziness
- Alopecia
- sweating
- Diarrhea

Post-intensive care syndrome (PICS) is not uncommon and includes:

- Anxiety (most common)
- Depression
- PTSD
- Cognitive symptoms

Functional impairment reported in over 40 % of patients

- Only 40% independent in all activities at 1 month
- Only 60% returned to normal activities at 2 months
- Over 50 % had abnormal Short Physical Performance Battery (SPPB and 2-minute walking test) at 4 months

Time to Symptom Resolution

Has wide variability in time to resolution

- Severity of illness is associated with duration of symptoms but there is great overlap
- Patients who were never hospitalized may have prolonged and persistent symptoms

Longer in certain groups of patients such as:

- Premorbid conditions
- Patients requiring hospitalization
- Older patients with preexisting comorbidities
- Those who experienced medical complications
- Those who suffered a prolonged hospital or ICU stay

Time to Symptom Resolution

Symptoms that usually resolve within 2-4 weeks:

- Fever
- Chills
- Olfactory/gustatory symptoms

Symptoms that may last for 2-6 months

- Fatigue
- Dyspnea
- Cough
- Chest tightness
- Cognitive deficits
- Psychological effects

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Comprehensive History of Acute Illness

COVID-19 testing

Duration and severity of illness

If hospitalized

- Types and severity of complications (eg, VTE, AKI, O₂ requirements, noninvasive or invasive ventilation requirements, etc.)
- Cardiac complications
- Delirium
- Treatments implemented

Comprehensive Physical Exam

Neck

- Jugular distention
- Complications of tracheotomy

Heart

- Presence of 3rd or 4th heart sound
- Presence of murmurs

Lungs

- Wheezing, Rhonci
- Rales, diffuse vs bibasilar, dry vs wet

Extremities

- Edema, signs of DVT

Laboratory Testing in Patients with Post COVID-19 Conditions

Basic diagnostic laboratory testing to consider

CATEGORY	LAB TESTS
Blood count, electrolytes, and renal function	Complete blood count with possible iron studies to follow, basic metabolic panel, urinalysis
Liver function	Liver function tests or complete metabolic panel
Inflammatory markers	C-reactive protein, erythrocyte sedimentation rate, ferritin
Thyroid function	TSH and free T4
Vitamin deficiencies	Vitamin D, vitamin B12

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/post-covid-assessment-testing.html>

More specialized diagnostic laboratory

BNP and troponin

- In patients whose course was complicated by CHF or myocarditis, or in those with possible cardiac symptoms from underlying myocarditis (eg, dyspnea, chest discomfort, edema).

D-dimer

- in patients with unexplained persistent or new dyspnea, or in any patient in whom there is a concern for thromboembolic disease.

Antinuclear antibody and creatinine kinase

- In patients with arthralgias, myalgias, or other symptoms concerning for rheumatologic disorders.

SARS-CoV-2 Serology

- For patients with prior COVID-19 based upon symptoms, but without a documented positive molecular antigen test, the value of obtaining SARS-CoV-2 serology is unclear but may be helpful

Post COVID-19 Conditions Management

Patient Workup by Primary Care

Evaluate for diagnosed or undiagnosed premorbid conditions

Fatigue

- Rule out secondary causes such as hypo/hyperthyroidism, CHF, OSA, myopathy
 - Thyroid panel, BNP, sleep study, total CK
- Consider physical therapy

Dyspnea

- Comprehensive physical exam, Chest X ray, EKG, BNP, D-dimer, echocardiogram

Hematologic Manifestations

- Acute COVID-19 associated thromboembolism is secondary to the hyperinflammatory and hypercoagulable state
- Both the duration and severity of this hyper-inflammatory state contribute to the risk of thrombotic complications in the post-COVID-19 phase.
- Guidelines recommend anticoagulation therapy for a minimum duration of 3 months in COVID-19 patients who develop proximal DVT or PE.

Renal Manifestations

- A significant proportion (20%) of severe COVID-19 patients requiring intubation also required renal replacement therapy(RRT) during hospitalization. The majority of them did not require dialysis near discharge.

Post COVID-19 Conditions Management

Patient Workup by Primary Care

Endocrine Manifestations

- Viral injury, inflammatory and immunologic damage contribute to post-acute COVID-19 endocrine manifestations.
- Isolated case reports of DKA, Subacute, and Hashimoto thyroiditis have been reported weeks after resolving acute COVID-19 symptoms
- Immobilization, steroid use, vitamin D deficiency during acute and post-acute recovery of COVID-19 might contribute to bone demineralization.

Neuropsychiatric Manifestations

- Microvascular thrombi, systemic inflammation, direct viral-mediated neurotoxicity are hypothesized to be the possible mechanisms contributing to neuropathology in COVID-19.
- Dysautonomia, deconditioning, and posttraumatic stress disorder can contribute to post COVID-19 brain fog.
- Prolonged duration of ICU stay, prolonged intubation contribute significantly to long-term cognitive impairment in COVID-19 patients
- Patients should be screened for common psychological issues such as anxiety, depression, insomnia, PTSD
- EEG and EMG be considered if there are concerns for seizures and paresthesias, respectively

Post COVID-19 Conditions: Cardio-Pulmonary Manifestations

Dyspnea is the most common persistent symptom beyond acute COVID-19

- Ranging from 42–66% prevalence at 60–100 d follow-up.
- In the COVID-19 US study, at 60-day follow-up 6.6% required supplemental oxygen and 6.9% required CPAP during sleep
- In a Spanish study of 1,800 patients requiring tracheostomies only 52% were weaned from MV 1 month later

Patients with greater severity of acute COVID-19 are at the highest risk for long-term pulmonary complications such as:

- Persistent diffusion impairment and radiographic pulmonary abnormalities (such as pulmonary fibrosis).

The long-term risks of chronic pulmonary embolism and consequent pulmonary hypertension are unknown.

Patients at high risk of post COVID-19 pulmonary conditions are:

- All patients managed on intensive care unit or high-dependency unit.
- All patients discharged with a new oxygen prescription.
- All patients with protracted dependency on high inspired fractions of oxygen, continued positive pressure ventilation and bi-level non-invasive ventilation.

Post COVID-19 Cardiopulmonary Conditions You Do Not Want to Miss

Identify early the most serious and potentially life-limiting complications

- Organizing Pneumonia
- Pulmonary fibrosis
- Pulmonary thromboembolism
- Pulmonary Hypertension
- Bacterial/fungal Infectious complications (Pneumonia)

Tests

- Chest CT w or wo contrast
- Pulmonary function tests
- 6 min walk or similar
- EKG/Echocardiogram



Cardiopulmonary testing in Patients with Cardiopulmonary symptoms

Only to be performed in Patients

- With symptoms
- As follow-up of previous documented imaging abnormality

What type of tests:

- Chest imaging and electrocardiography (ECG) will suffice for the majority of patients
- Additional tests (echocardiography, Holter monitoring, PFT's) may be necessary in select patients.

Chest Imaging necessary for

- All patients who had an abnormality identified on imaging obtained during COVID-19 illness,
- In any patient with new or worsening respiratory symptoms or an abnormal cardiopulmonary physical examination

Type of imaging

- For most patients, chest radiography is sufficient. Chest CT when you are suspecting PTE or pulmonary fibrosis

Timing

- Have a high index of suspicion for VTE
- Resolution may require 12 weeks or longer

Lung abnormalities

- May persist on chest CT for six months or longer in 50 percent of previously hospitalized patients, even among those with non-severe respiratory disease
- Earlier imaging may be needed in patients with worsening or new respiratory symptoms, or complicating pathology is suspected

Guidance on “Long COVID” as a Disability Under the ADA, Section 504, and Section 1557

In light of the rise of long COVID as a persistent and significant health issue

- The Office for Civil Rights of the Department of Health and Human Services and the Civil Rights Division of the Department of Justice have joined together to provide this guidance.

This guidance explains that long COVID can be a disability under:

- Titles II (state and local government) and III (public accommodations) of the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act of 1973 (Section 504), and Section 1557 of the Patient Protection and Affordable Care Act (Section 1557).
- Each of these federal laws protects people with disabilities from discrimination.

Long COVID can be a disability under the ADA, Section 504, and Section 1557 if it substantially limits one or more major life activities.

- These laws and their related rules define a person with a disability as an individual with a physical or mental impairment that substantially limits one or more of the major life activities of such individual (“actual disability”);
- A person with a record of such an impairment (“record of”); or a person who is regarded as having such an impairment (“regarded as”).
- A person with long COVID has a disability if the person’s condition or any of its symptoms is a “physical or mental” impairment that “substantially limits” one or more major life activities.

Is long COVID always a disability? No

- An individualized assessment is necessary to determine whether a person’s long COVID condition or any of its symptoms substantially limits a major life activity. The CDC and health experts are working to better understand long COVID.

Post COVID-19 Conditions: Prevention

Vaccination

Wearing of masks/cloth face coverings

Maintain physical distance 6 feet

Avoid crowds and congregate settings

Outdoors better than indoors

Frequent handwashing