Long COVID

TERESA HARDESTY DO, MHA

Disclosures

None

Objectives

Review the epidemiology and pathophysiology believed to be behind long COVID.

Discuss the most common disease manifestations associated with long COVID

Review the algorithmic approach to a patient who appears to be suffering from long COVID

Recognize the timeline of long COVID.

Examine the interdisciplinary treatment approach to long COVID, including OMM as a treatment option

What is Long COVID

Definition of Long COVID condition:

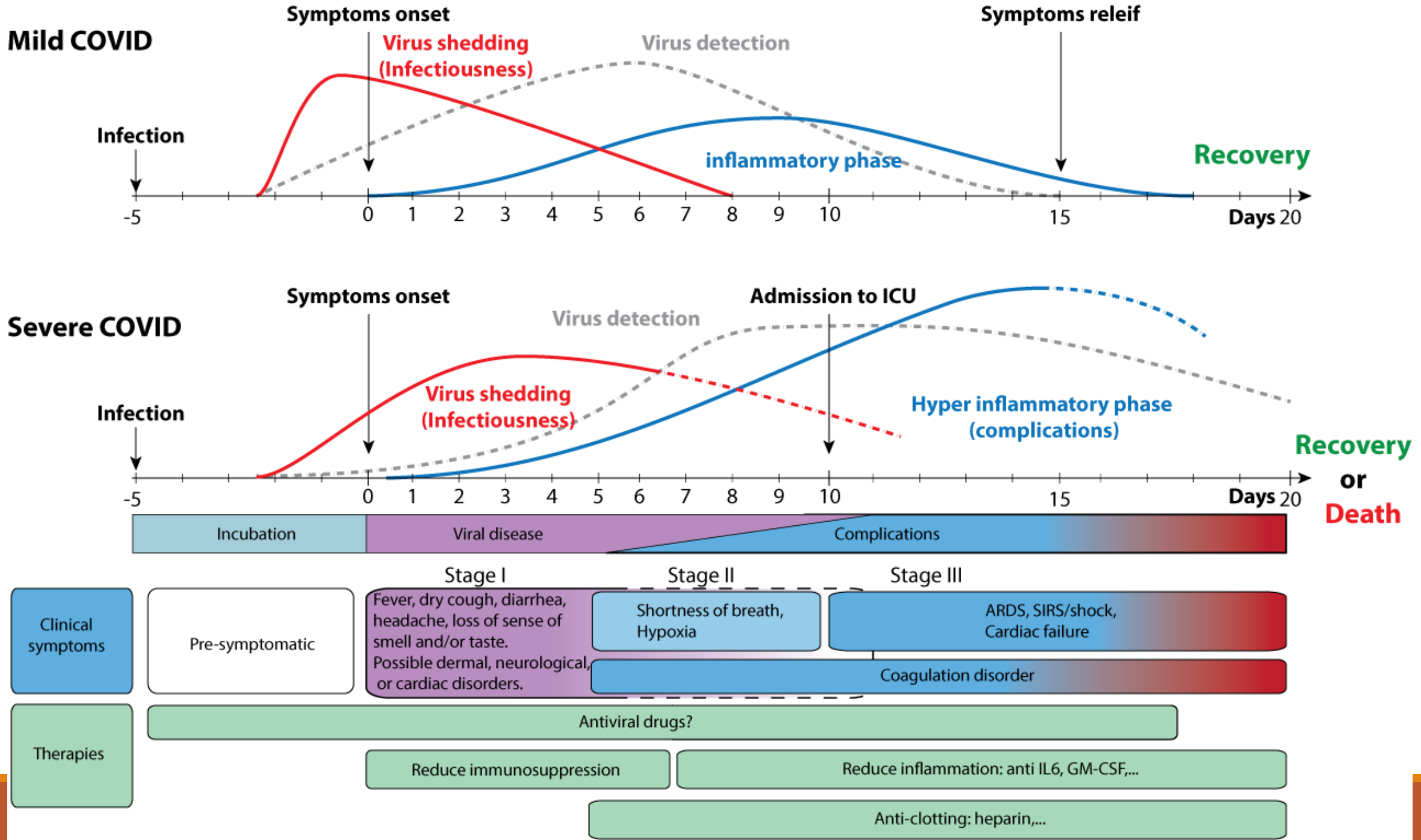
"Post COVID condition" is an umbrella term for a wide range of physical and mental health consequences experienced by some patients that are present four or more weeks after SARS CoV-2 infection.

Other terms:

- Long haul COVID
- Post acute COVID
- Post acute sequelae of SARS CoV-2 infection (PASC)
- Chronic COVID

Patterns of Long COVID:

- Persistent symptoms
- New onset late sequelae
- Evolution of symptoms/conditions


Mild COVID
Symptoms onset
Virus shedding
(Infectiousness)
Virus detection
Symptoms releif
Infection
inflammatory phase
Recovery
-5
0
1
2
3
4
5
6
7
8
9
10
15
Days 20
Severe COVID
Symptoms onset
Admission to ICU
Virus detection
Virus shedding
(Infectiousness)
Infection
Hyper inflammatory phase
(complications)
Recovery
or
Death
-5
0
1
2
3
4
5
6
7
8
9
10
15
Days 20
Incubation
Viral disease
Complications
Stage I
Stage II
Stage III
Clinical symptoms
Pre-symptomatic
Fever, dry cough, diarrhea, headache, loss of sense of smell and/or taste. Possible dermal, neurological, or cardiac disorders.
Shortness of breath, Hypoxia
ARDS, SIRS/shock, Cardiac failure
Coagulation disorder
Therapies
Antiviral drugs?
Reduce immunosuppression
Reduce inflammation: anti IL6, GM-CSF,...
Anti-clotting: heparin,...

Epidemiology

Challenges in determining prevalence (estimates ranging 5-30%):

- Differing symptoms or conditions investigated
- The temporal criteria used (three weeks up to many months following SARS-CoV-2 infection)
- The study settings (outpatient vs inpatient)
- How symptoms and conditions are assessed (e.g., self-report vs electronic health record database)

Prevalence higher among:

- Females (9.4% vs .5.5%)
- Multiple Comorbidities
- Unvaccinated/Un-boosted
- Ethnicity:
  - 9% of Hispanic adults
  - Non-Hispanic White (7.5%)
  - Black (6.8%) adults
  - non-Hispanic Asian adults (3.7%).

COVID-19 Weekly Cases per 100,000 Population by Sex, United States

March 01, 2020 - February 11, 2023*

Jurisdiction

US

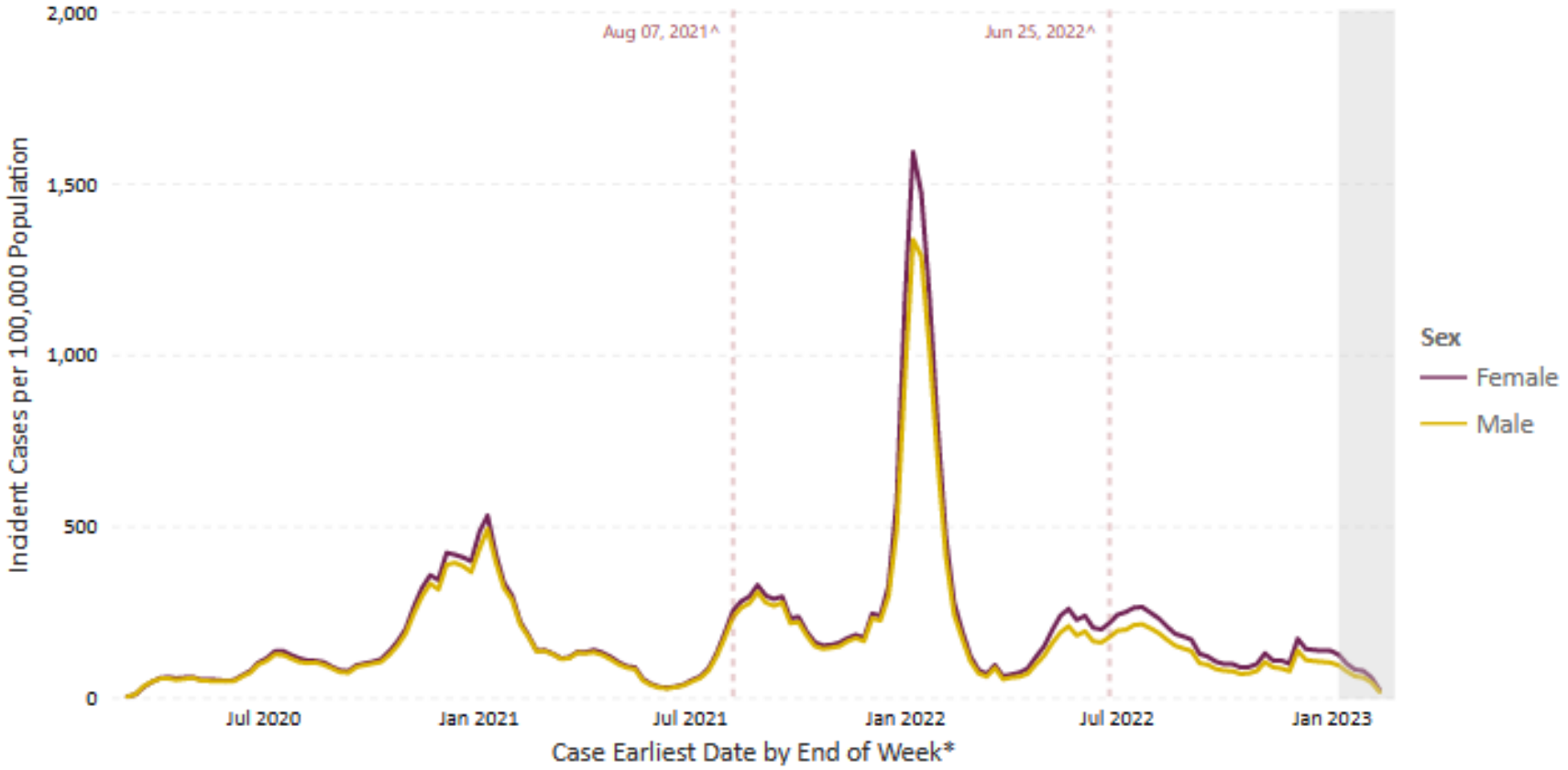
3/7/2020 2/11/2023

Cases

- Sex
- Age - All Groups
- Age by Race/Ethnicity
- Pediatric Case Proportions
- Race/Ethnicity
- Race/Ethnicity by Age

Deaths

- Sex
- Age - All Groups
- Age by Race/Ethnicity
- Race/Ethnicity
- Race/Ethnicity by Age



US: Includes data up to the week ending on Feb 11, 2023. Percentage of cases reporting sex by date - 98.03%.

US territories are included in case and death counts but not in population counts. Potential six week delay in case reporting to CDC denoted by gray bars. Weekly data with five or fewer cases have been suppressed. *Case Earliest Date is the earliest of the clinical date (related to illness or specimen collection and chosen by a defined hierarchy) and the Date Received by CDC. The date for the current week extends through Saturday. ^Case rates for South Dakota during the week ending Aug 07, 2021, and Texas during the week ending Jun 25, 2022, are reflective of a data reporting artifact. Surveillance data are provisional, and as additional clinical date data becomes available, the case rates over time are subject to change.

Source: CDC COVID-19 Case Line-Level Data, 2019 US Census, HHS Protect; Visualization: Data, Analytics & Visualization Task Force and CDC CPR DEO Situational Awareness Public Health Science Team

Last Updated: Feb 17, 2023

COVID-19 Weekly Cases per 100,000 Population by Race/Ethnicity, United States

March 01, 2020 - February 11, 2023*

Jurisdiction

US

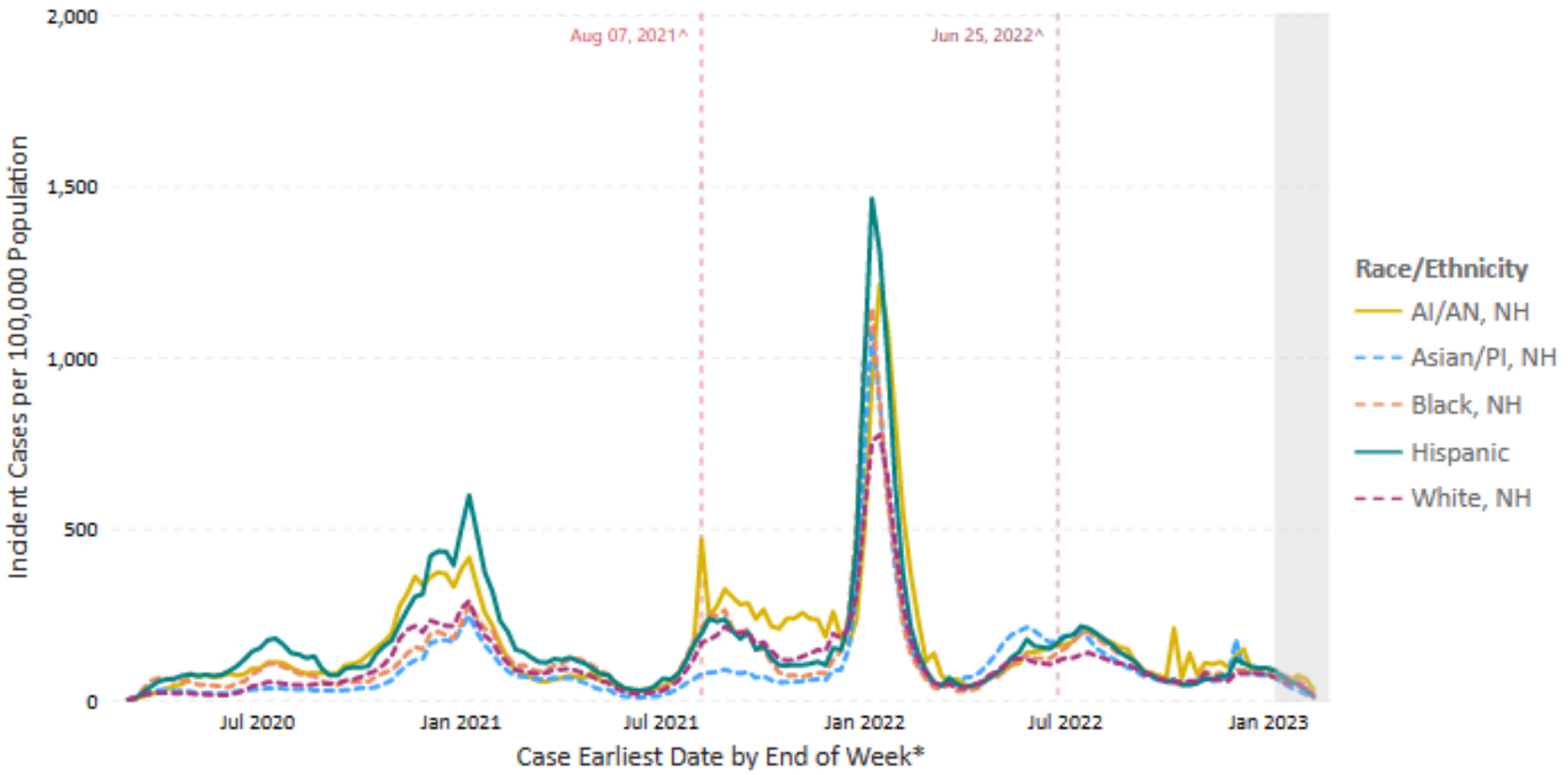
3/7/2020 2/11/2023

Cases

- Sex
- Age - All Groups
- Age by Race/Ethnicity
- Pediatric Case Proportions
- Race/Ethnicity
- Race/Ethnicity by Age

Deaths

- Sex
- Age - All Groups
- Age by Race/Ethnicity
- Race/Ethnicity
- Race/Ethnicity by Age



US: Includes data up to the week ending on Feb 11, 2023. Percentage of cases reporting race by date : 63.85%.

US territories are included in case and death counts but not in population counts. Potential six week delay in case reporting to CDC denoted by gray bars. Weekly data with five or fewer cases have been suppressed. AI – American Indian, AN – Alaska Native, NH – Non Hispanic, PI – Pacific Islander. Excludes cases with unknown or multiple races. *Case Earliest Date is the earliest of the clinical date (related to illness or specimen collection and chosen by a defined hierarchy) and the Date Received by CDC. The date for the current week extends through Saturday. ^Case rates for South Dakota during the week ending Aug 07, 2021, and Texas during the week ending Jun 25, 2022, are reflective of a data reporting artifact. Surveillance data are provisional, and as additional clinical date data becomes available, the case rates over time are subject to change.

DRIVERS OF INCREASED SUSCEPTIBILTIY

Racial and Ethnic Minorities

- Increased risk for exposure & severe manifestation of COVID-19
- Socioeconomic factors prevent proper self-isolation
- Less access to primary and specialty care
- Distrust of medical institutions
- Higher rate of pre-existing conditions
- Multimorbidity

Older Population

- Increased risk for severe COVID-19
- Higher rate of pre-existing conditions
- Multimorbidity

Clinical Complexity

- Pre-existing conditions (obesity, diabetes, heart/lung disease, etc.)
- Multimorbidity
- Severe COVID-19 manifestation
- Prior mental health history
- Women

Rural Residents

- Increased risk for exposure to COVID-19
- Decreased healthcare infrastructure
- Older population
- Higher rate of pre-existing conditions
- Multimorbidity

Jiang et al. JACC Basic Transl Sci (2021) 6:796


AMERICAN INDIAN OR ALASKA NATIVE
2.5
times more likely to go to the hospital
BLACK OR AFRICAN AMERICAN
2.1
times more likely to go to the hospital
HISPANIC OR LATINO
1.9
times more likely to go to the hospital
ASIAN
0.7
times more likely to go to the hospital

Serious Cases of Covid Increase Long Covid Risk

Estimated share of surveyed Covid-19 cases (2020-2021) with long Covid symptoms (in %)

Based on a meta analysis of 54 studies,
1.2 million Covid-19 cases 2020-2021, 22 countries

Sources: JAMA Network, Global Burden of Disease Long COVID Collaborators

More than

500 million

people around the world have had COVID. It's possible that **millions of them could have long-term health effects.**

American Academy of Physical Medicine and Rehabilitation

Data as of 2/27/2023

View Dashboard Assumptions, Methodology, and Sources

SUMMARY | BY STATE

FILTERS

(reset to default)

Select Est. PASC %

30%

Select a State

All

Select a County

All

MODEL ASSUMPTIONS AND SOURCES

(see all)

1. Model assumes 30% of COVID-19 surviving cases in the U.S. result in PASC.

2. COVID-19 surviving cases are confirmed cases less deaths.

3. U.S. case data is pulled nightly from JHU CSSE COVID-19 Data. U.S. Census data uses 2019 1-year estimates.

Powered by

COVID-19 SURVIVING CASES (TOTAL)

100,554,103

PASC CASES (ESTIMATED)

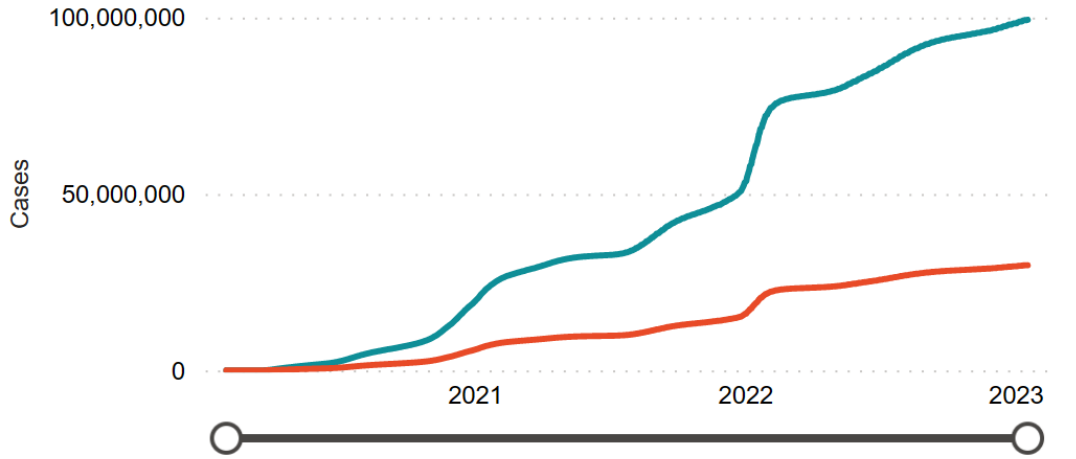
30,166,231

ESTIMATED PASC CASES PER STATE

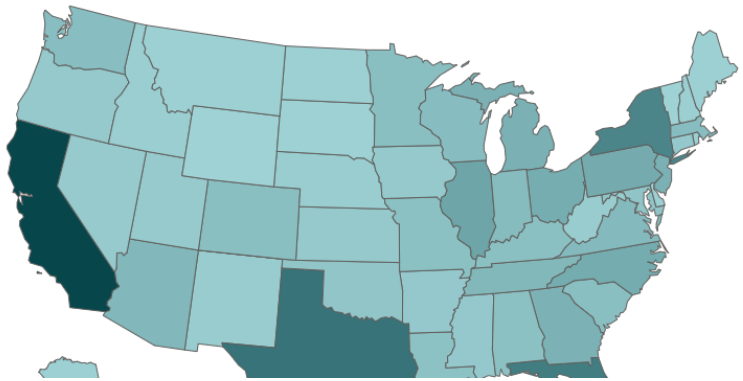
State	PASC Cases (Estimated)
California	3,547,760
Texas	2,434,354
Florida	2,191,882
New York	1,972,484
Illinois	1,183,404
Pennsylvania	1,019,575
North Carolina	1,006,354
Ohio	987,155
New Jersey	879,050
Michigan	874,832
Georgia	858,479
Arizona	707,818
Tennessee	695,913
Virginia	659,814

CUMULATIVE AND DAILY CASES

Select Display: Cumulative / Daily



PASC CASES (ESTIMATED)



Post-Acute Sequelae of SARS-CoV-2 Infections (PASC) Estimates and Insights

American Academy of Physical Medicine and Rehabilitation

Data as of 2/27/2023

View Dashboard Assumptions, Methodology, and Sources

SUMMARY | BY STATE

FILTERS

(reset to default)

Select Est. PASC %

30%

Select a State

Oklahoma

Select a County

All

MODEL ASSUMPTIONS AND SOURCES

(see all)

1. Model assumes 30% of COVID-19 surviving cases in the U.S. result in PASC.

2. COVID-19 surviving cases are confirmed cases less deaths.

3. U.S. case data is pulled nightly from JHU CSSE COVID-19 Data. U.S. Census data uses 2019 1-year

COVID-19 SURVIVING CASES (TOTAL)

1,245,734

PASC CASES (ESTIMATED)

373,720

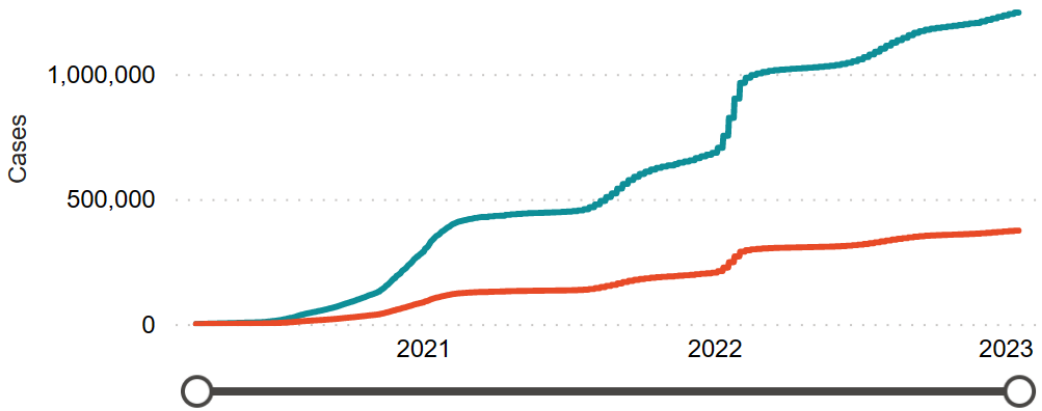
ESTIMATED PASC CASES PER STATE

State	PASC Cases (Estimated)
Oklahoma	373,720

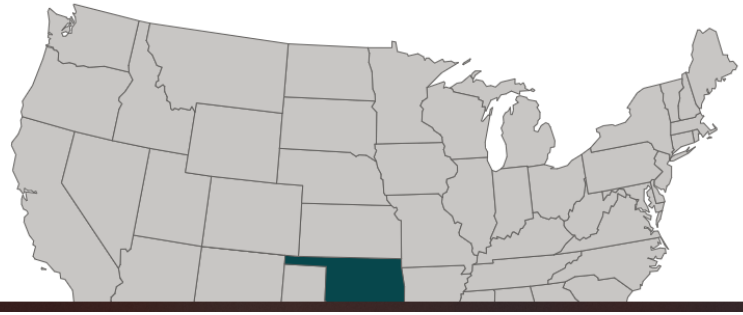
CUMULATIVE AND DAILY CASES

Select Display: Cumulative / Daily

COVID-19 Surviving Cases · PASC Cases (Estimated)



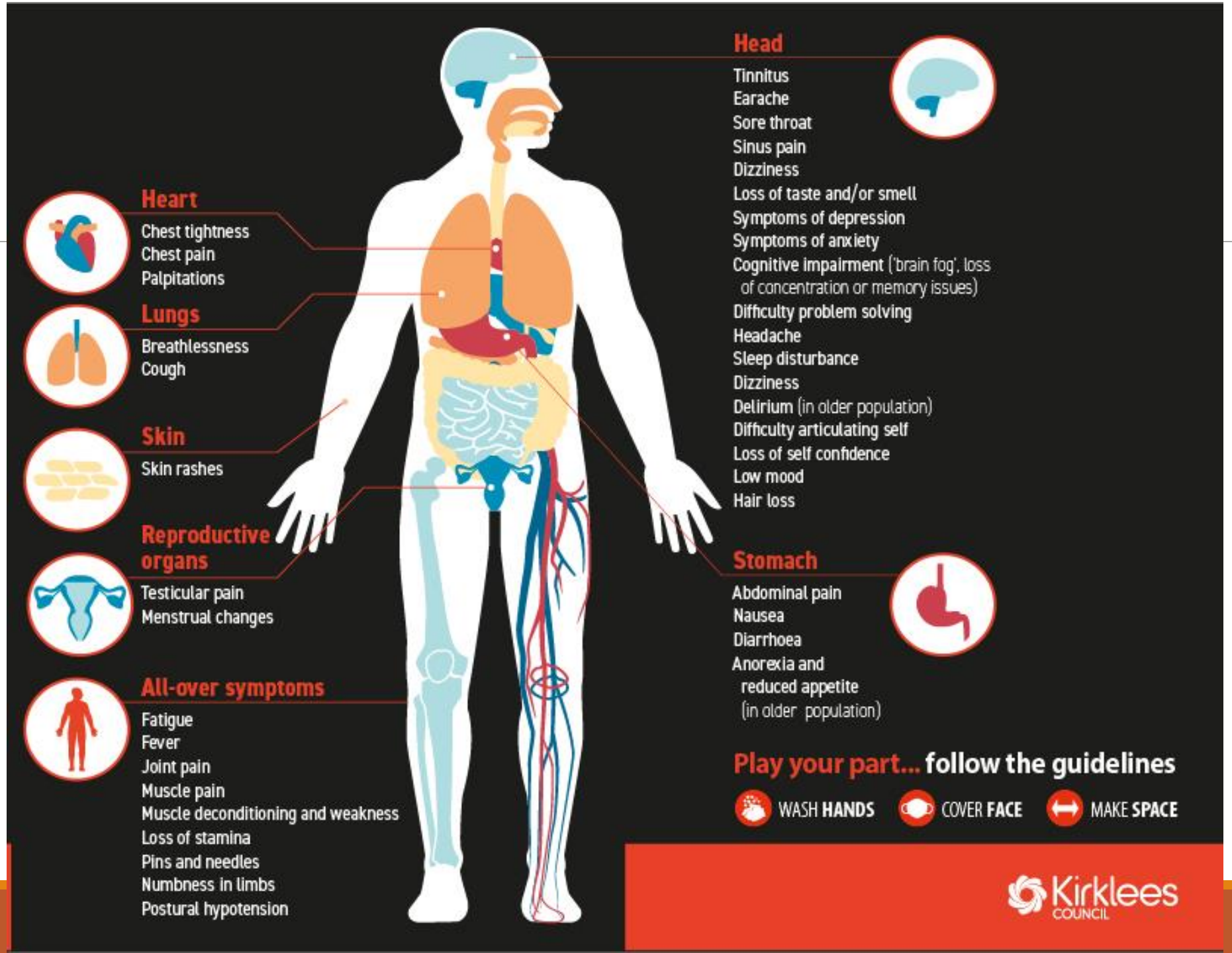
PASC CASES (ESTIMATED)



Pathophysiology

- **Residual organ damage:** This theory holds that the symptoms of Long COVID are due to residual damage to organs caused by the body's own immune response to the infection.
- **Remaining virus:** This theory suggests that after the immune system eliminates the virus, some remnants of it survive in one or more organs, and it continues to stimulate an immune response.
- **Exaggerated immune response:** According to this theory, in some people, COVID-19 sparks an exaggerated immune response; the immune system then remains in an overexcited state, resulting in various symptoms.

Symptoms & Disease Manifestations


Head
Tinnitus
Earache
Sore throat
Sinus pain
Dizziness
Loss of taste and/or smell
Symptoms of depression
Symptoms of anxiety
Cognitive impairment ('brain fog', loss of concentration or memory issues)
Difficulty problem solving
Headache
Sleep disturbance
Dizziness
Delirium (in older population)
Difficulty articulating self
Loss of self confidence
Low mood
Hair loss
Heart
Chest tightness
Chest pain
Palpitations
Lungs
Breathlessness
Cough
Skin
Skin rashes
Reproductive organs
Testicular pain
Menstrual changes
All-over symptoms
Fatigue
Fever
Joint pain
Muscle pain
Muscle deconditioning and weakness
Loss of stamina
Pins and needles
Numbness in limbs
Postural hypotension
Stomach
Abdominal pain
Nausea
Diarrhoea
Anorexia and reduced appetite (in older population)
Play your part... follow the guidelines
WASH HANDS
COVER FACE
MAKE SPACE
Kirklees COUNCIL

Complications of COVID

Body System	Conditions
Cardiovascular	Myocarditis, heart failure, pericarditis, postural orthostatic tachycardia syndrome (POTS)
Pulmonary	Interstitial lung disease, reactive airway disease
Renal	Chronic kidney disease
Rheumatological	Reactive arthritis, fibromyalgia
Endocrine	Diabetes mellitus, hypothyroidism
Neurological	TIA/stroke, sleep dysregulation, altered cognition, memory impairment, headache, neuropathy
Psychiatric	Depression, anxiety, PTSD, OCD
Hematological	Pulmonary embolism, hypercoagulability
Urologic	Incontinence, sexual dysfunction
Other	Weight loss, pain syndromes, hearing loss, progression of comorbid conditions

Type, proportion, and duration of persistent COVID-19 symptoms*

Persistent symptom¶	Proportion of patients affected by symptom	Approximate time to symptom resolutionΔ
Common physical symptoms		
Fatigue	15 to 87%[1,2,6,9,14,16]	3 months or longer
Dyspnea	10 to 71%[1,2,6-9,14]	2 to 3 months or longer
Chest discomfort	12 to 44%[1,2]	2 to 3 months
Cough	17 to 34%[1,2,9,12]	2 to 3 months or longer
Anosmia	10 to 13%[1,3-5,9,11]	1 month, rarely longer
Less common physical symptoms		
Joint pain, headache, sicca syndrome, rhinitis, dysgeusia, poor appetite, dizziness, vertigo, myalgias, insomnia, alopecia, sweating, and diarrhea	<10%[1,2,8,9,11]	Unknown (likely weeks to months)
Psychologic and neurocognitive		
Post-traumatic stress disorder	7 to 24%[6,10,14]	6 weeks to 3 months or longer
Impaired memory	18 to 21%[6,15]	Weeks to months
Poor concentration	16%[6]	Weeks to months
Anxiety/depression	22 to 23%[2,7,8,10,12-14]	Weeks to months
Reduction in quality of life	>50%[8]	Unknown (likely weeks to months)

Prevention

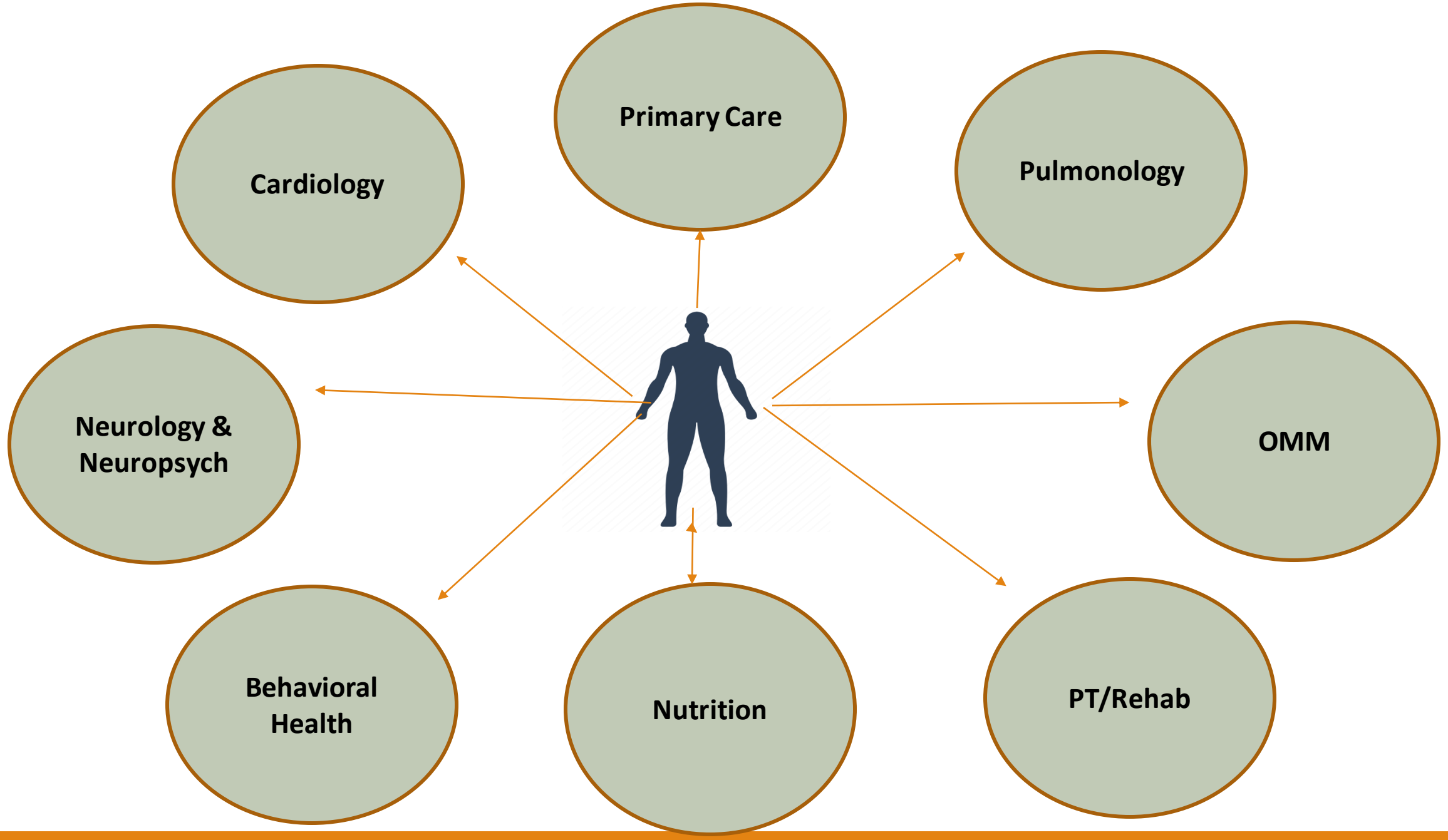
Protect yourself from becoming infected:

- ❑Vaccines
- ❑Hand Hygiene
- ❑Social distancing/masking

Treatment approach to Long COVID

- Setting expectations with patients and their families
- Continuing follow-up over the course of illness. Broaden testing and management as needed
- Partnering with specialists for physical and mental health care and rehabilitation services.
- Connecting patients to social services, 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. (https://longcovidalliance.org/)

Long COVID Clinics


Primary Care
Cardiology
Pulmonology
Neurology & Neuropsych
OMM
Behavioral Health
Nutrition
PT/Rehab

OKLAHOMA STATE UNIVERSITY
MEDICINE

POST-COVID

ASSESSMENT AND RECOVERY CLINIC

Certain individuals who have recovered from active COVID-19 infection continue to have difficulties in physical, emotional and cognitive functioning. This includes multifaceted lingering health effects and an overall worsened quality of life. Given the novelty of COVID-19, the exact nature of these ongoing health effects remains uncertain.

To address these issues, OSU Medicine has created a multidisciplinary clinic to screen, assess, treat, and provide referrals and resources for patients recovering from COVID-19. These patients will be followed over time in order to address new needs as they emerge. In addition, this clinic will serve to create a registry to accurately track important clinical data for a disease about which little is known.

List of Symptoms (not exclusionary)

- Shortness of Breath
- Chest Discomfort
- Wheezing
- Cough
- Palpitations
- Fatigue
- Exertion Intolerance
- Headaches
- Brain Fog/Memory Impairment
- Hearing Loss
- Muscle Aches/Weakness
- Joint Pain
- Diarrhea
- Nausea and/or Vomiting
- Weight Loss

OSU Internal Medicine

918-382-5064
717 S Houston Ave
STE 300
Tulsa, OK 74127

Coordinating Specialties

OMM
Neurology
Cardiology
OT/PT
Behavioral Health
Pulmonology

Epic Order for Internal Referrals:

Ambulatory referral to COVID Long Hauler - Ref 439

COVID Clinic Patient Questionnaire

Date of COVID diagnosis _____

Were you hospitalized for COVID **Yes/No**

Were you given supplemental oxygen when you went home **Yes/No**

Were you on a ventilator **Yes/No**

Did you receive a COVID antibody infusion **Yes/No**

Have you received the COVID vaccine **Yes/No**

If Yes, what was date of last vaccine _____

1. Since your illness have you begun to have any new problems with any of the following: (Please circle all that apply)

a. A lower mood than normal or decreased interest in your usual activities? **Yes/No**

b. Excessive anxiety? **Yes/No**

c. Recurrent thoughts or impulses that keep repeating over and over and are difficult to get out of your mind? **Yes/No**

d. Repetitive behaviors that you have a hard time not doing even though you want to? **Yes/no**

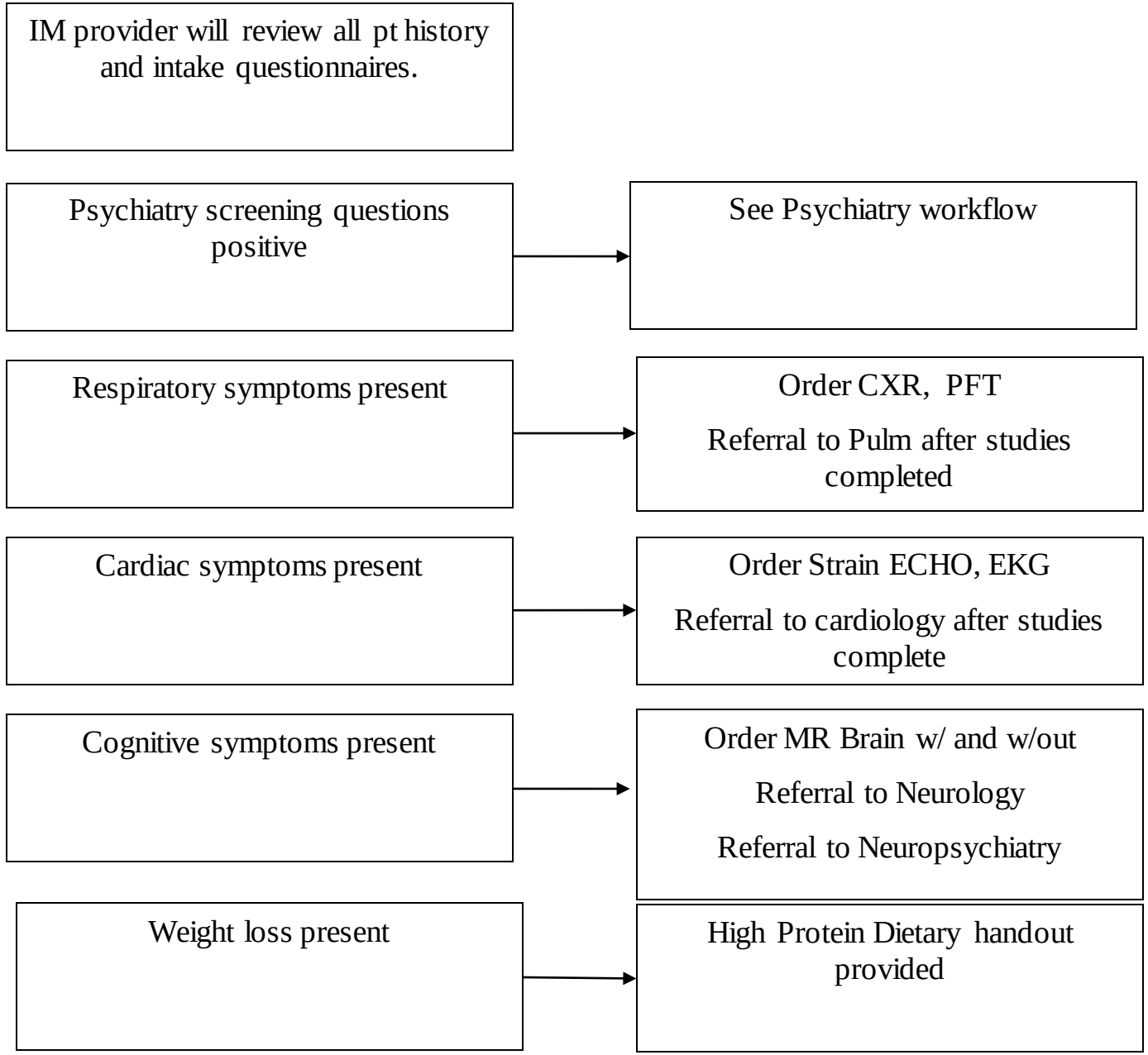
2. Did you experience intense fear, helplessness, or feelings of horror during your illness? If so, do you still tend to reexperience these feelings in some way such as in nightmares, feeling as if the experience were happening all over, or have these feelings when exposed to things that make you remember the experience? **Yes/No**

After being diagnosed with COVID, have you experienced any of the following symptoms: (**Answer "Yes" only to symptoms which began after COVID or worsened after COVID**)

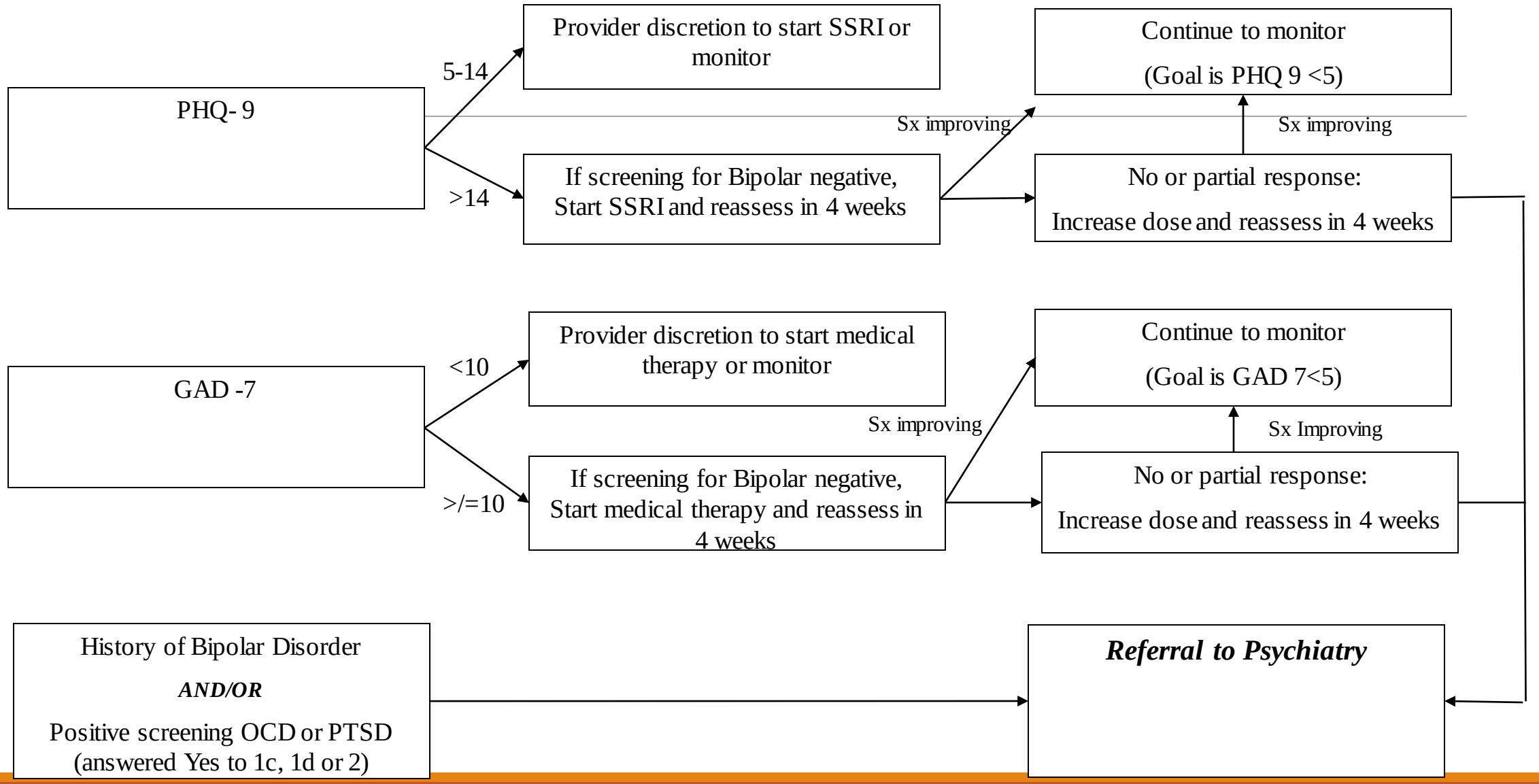
If you answered "Yes", select one:

Symptoms	Yes/No	Mild	Moderate	Severe
Shortness of breath	Yes/No			
Chest discomfort	Yes/No			
Cough	Yes/No			
Wheezing	Yes/No			
Ongoing fever	Yes/No			
Palpitations	Yes/No			
Fatigue	Yes/No			
Fatigue or shortness of breath on exertion	Yes/No			
Headaches	Yes/No			
Ringing in your ears	Yes/No			
Hearing loss	Yes/No			
Loss of smell or altered smell	Yes/No			
Loss of taste or altered taste	Yes/No			
Difficulty swallowing	Yes/No			
Changes in your voice	Yes/No			
Nausea or vomiting	Yes/No			
Diarrhea	Yes/No			
Abdominal pain	Yes/No			
Loss of appetite	Yes/No			
Weight loss	Yes/No			
Weakness	Yes/No			
Difficulty with memory or "brain fog"	Yes/No			
Difficulty sleeping	Yes/No			
Dizziness	Yes/No			
Heat/cold intolerance	Yes/No			

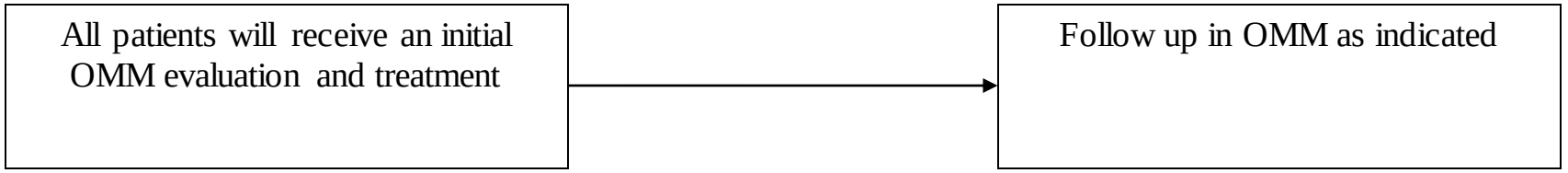
Internal Medicine



Psychiatry


PHQ- 9
5-14
>14
Provider discretion to start SSRI or monitor
If screening for Bipolar negative, Start SSRI and reassess in 4 weeks
Sx improving
Continue to monitor
(Goal is PHQ 9 <5)
Sx improving
No or partial response:
Increase dose and reassess in 4 weeks
GAD -7
<10
>/=10
Provider discretion to start medical therapy or monitor
If screening for Bipolar negative, Start medical therapy and reassess in 4 weeks
Sx improving
Continue to monitor
(Goal is GAD 7<5)
Sx Improving
No or partial response:
Increase dose and reassess in 4 weeks
Sx Not Improving
History of Bipolar Disorder
AND/OR
Positive screening OCD or PTSD (answered Yes to 1c, 1d or 2)
Referral to Psychiatry

OMM


All patients will receive an initial OMM evaluation and treatment
Follow up in OMM as indicated

AUTONOMIC NERVOUS SYSTEM DYSREGULATION

This provides suggestions as you engage in shared health care decision-making with Veterans. It is not intended to replace clinical judgement.

Autonomic nervous system dysregulation may be present even after mild cases of COVID-19. Up to 48% of patients reported dizziness or light headedness greater than 4 weeks post-COVID-19.[7] (NICE, 2021) Of 180 post-COVID-19 patients, 7.2% experienced dizziness and 61% of patients had autonomic dysfunction.[8] (Stella A, 2022)

Things to Keep in Mind

- Signs and symptoms may manifest as palpitations, lightheadedness, dizziness, fatigue, blurry vision, falling, presyncope and decreased exercise tolerance
- Consider systemic conditions such as deconditioning, dehydration, anemia, hypoxia, anxiety, Parkinson's Disease, persistent fever, lung disease, and cardiac disease, including sinus node dysfunction, myocarditis, and heart failure
- Consider orthostatic hypotension versus orthostatic tachycardia
- Review medications such as diuretics, antidepressants, certain beta blockers
- Assess pregnancy/lactation status, review teratogenic medications

Evaluation

Labs to Consider

- Comprehensive Metabolic Panel (CMP)
- Glucose (hypoglycemia)
- Complete Blood Count (CBC) (anemia)

Tests to Consider

- Electrocardiogram (EKG) (arrythmia)
- Evaluate for orthostatic blood pressure (lying, standing) for up to 10 minutes:
  - Have patient lie down for 5 minutes and then measure blood pressure (BP) and heart rate (HR). Have patient stand up and measure BP and HR after every 2 minutes for 10 minutes
  - If there is a drop of systolic blood pressure (SBP) by 20 points or diastolic blood pressure (DBP) by 10 points, then it is considered positive for orthostatic hypotension
  - If the HR increases by >30 BPM without hypotension, then it is positive for orthostatic tachycardia

PACT Management to Consider

- ICD-10 Code: U09.9, Post-COVID-19 condition, unspecified
- Post-Acute Sequelae of COVID-19 and Cardiovascular Autonomic Dysfunction: What Do We Know?
- Consider using Composite Autonomic Symptom Score (COMPASS 31)[9] (Sletten DM, 2012) for evaluating symptom trends (Appendix D)
- Hydration immediately; for postural orthostatic tachycardia syndrome (POTS) consider 64 ounces of water intake daily
- Avoid or limit alcohol intake as it can worsen or precipitate orthostatic hypotension
- Use of salt with caution especially if there is history of left ventricular dysfunction (LVD); POTS recommendation is 3000-5000 mg per day
- Avoid strenuous activity in hot weather
- Start with recumbent or semi-recumbent exercise (rowing, swimming, cycling) with gradual transition to upright exercise (walking, jogging, elliptical) as orthostatic intolerance improves
- Titrated return to activity program (Appendix B)
- Lifestyle modification including slowly getting out of bed before standing and use of compression stockings
- Frequent, small, balanced meals with whole foods, protein, vegetables, and fruits, and high fiber for POTS
- Biofeedback

Consults to Consider

- Cardiology:
  - If assessment is negative but high clinical suspicion for POTS
- Physical Therapy:
  - Titrated return to individualized activity program (Appendix B) and energy conservation techniques
- Occupational Therapy:
  - Energy conservation techniques
  - Activities of daily living (ADLs)
- Whole Health System approach:
  - Biofeedback, yoga, health coaching
- Nutrition

CHEST PAIN

This provides suggestions as you engage in shared health care decision-making with Veterans. It is not intended to replace clinical judgement.

Chest pain is a common symptom with almost 5% of those diagnosed with COVID-19 reporting chest pain >12 weeks after initial illness.[10] (Whitaker M, 2022) The usual conditions are considered in the differential for recurrent chest pain. [11] (Gluckman T, 2022) In particular after COVID-19, cardiovascular conditions including myocardial infarction (MI) and myocarditis were noted to be higher compared to those without COVID-19, even in younger patients. [12] (Xie Y, 2022) The reason is unclear but may be related to virally mediated vascular endothelial injury or indirectly from the immune response. [13] (Bellan M, 2021) Furthermore, there seems to be a number of people with atypical chest pain that may be part of a post-COVID-19 pain syndrome.

Things to Keep in Mind

- The evaluation is similar to routine evaluation for chest pain
- Maintain a high degree of suspicion for coronary artery disease (CAD), myocarditis/pericarditis, and venous thromboembolism (VTE) given elevated risk after COVID-19 infection
- Assess pregnancy/lactation status, review teratogenic medications

Evaluation

Labs to Consider

- None

Tests to Consider

- Additional testing as indicated by history and exam

PACT Management to Consider

- ICD-10 Code: U09.9, Post-COVID-19 condition, unspecified
- For pleuritic pain or costochondritis:
  - Diaphragmatic breathing
  - Stretching
  - 1 or 2 weeks of low dose non-steroidal anti-inflammatory drugs (NSAID)
  - If signs and symptoms worsen, consider gastrointestinal causes like esophagitis or esophageal spasm

Consults to Consider

- Cardiology: if no improvement with initial therapies described, or concern for underlying cardiac disease or complications (myocarditis, heart failure, ischemia/CAD, arrhythmia)
- Physical Therapy: for accessory muscle usage/rib excursion after ruling out cardiac issues
- Chiropractic Care
- Whole Health System approach: health coaching, acupuncture

COGNITIVE IMPAIRMENT

This provides suggestions as you engage in shared health care decision-making with Veterans. It is not intended to replace clinical judgement.

Cognitive impairment is found in up to 60% of patients greater than 4 weeks after COVID-19. In some studies, 23% of patients reported persistent signs and symptoms more than 8 months after COVID-19.[14] (NICE, 2021)

Things to Keep in Mind

- Patient signs and symptoms[15] (AAPM&R, 2022)
  - Attention - Brain fog, lost train of thought, concentration problems
  - Processing Speed - Slowed thoughts
  - Motor Function - Slowed movements
  - Language - Word finding problems, reduced fluency
  - Memory - Poor recall, forgetting tasks
  - Mental Fatigue - Exhaustion, brain fog
  - Executive Function - Poor multitasking and/or planning
  - Visuospatial - Blurred vision, neglect
- Perform a workup aiming to address reversible causes of dementia or cognitive impairment
- Consider screenings for mental health, substance use and sleep disturbances
- Assess pregnancy/lactation status, review teratogenic medications

Evaluation

Labs to Consider

- B12
- Thyroid stimulating hormone (TSH)
- Glucose
- Rapid plasma reagin (RPR)

Tests to Consider

- For purely cognitive impairment without other neurologic signs and symptoms, magnetic resonance imaging (MRI) or head computed tomography (CT) is not routinely indicated

PACT Management to Consider

- ICD-10 Code: U09.9, Post-COVID-19 condition, unspecified
- Medication reconciliation
- Diaphragmatic breathing

Consults to Consider

- Occupational Therapy, Speech Language Pathology or Primary Care Mental Health Integration (PCMHI): perform Montreal Cognitive Assessment (MOCA), Mini-Mental State Exam (MMSE), or Saint Louis University Mental Status (SLUMS)
- Occupational Therapy and Speech Language Pathology: perform cognitive assessment, cognitive rehabilitation, functional assessment and evaluate impact upon activities of daily living (ADLs), work, school, and hobbies
- PCMHI: address mental health concerns associated with coping with new signs and symptoms, and provide cognitive behavioral therapy for insomnia (CBT-I)
- Nutrition: Nutrition optimization, food diary, and glucose regulation
- Whole Health System approach: mindfulness/meditation, Tai Chi, acupuncture, health coaching
- Neurology: At initial visit if there are focal signs and symptoms or “red flags” to suggest a systemic disease, OR potentially after 12-24 weeks if signs and symptoms worsen or persist, affecting daily function and quality of life despite cognitive rehabilitation

DYSPNEA

This provides suggestions as you engage in shared health care decision-making with Veterans. It is not intended to replace clinical judgement.

Post-COVID-19 dyspnea is common with multiple etiologies including cardiac, pulmonary, and neuromuscular issues. Prevalence is likely proportional to initial severity with dyspnea reported in ~5-10% of mild (outpatient) cases,[19] (Sudre CH, 2021) [20] (Nehme M, 2021) but up to 15-50% of those hospitalized.[21] (Carfi A, 2020) [22] (Froidure A, 2021) [23] (Jutant EM, 2022) Patients who initially had mild COVID-19, and did not experience hypoxemia or require hospitalization, are less likely to have post-acute pulmonary function or imaging abnormalities.[24] (AAPM&R, 2022)

Things to Keep in Mind

- A functional assessment evaluating ADLs and recovery time after activity is helpful for triaging severity and creating a titrated return to individualized activity program (Appendix B)
- Differentiate between dyspnea at rest (forgetting to breathe), dyspnea with movement (bending forward), dyspnea with exertion with or without hypoxemia, and post-exertional malaise (disproportionately long recovery time after exertion)
- Consider evaluation for pulmonary embolism (PE) [25] (Li P, 2021), coronary artery disease (CAD) [26] (Xie Y, 2022), interstitial lung disease and myocarditis[27] (Puntmann VO, 2020) [28] (Daniels CJ, 2021) if clinically indicated given higher rates after COVID-19
- Assess pregnancy/lactation status, review teratogenic medications

Evaluation

Labs to Consider

- Complete blood count (CBC)
- If on oral contraceptive pill (OCP) with relevant Wells or modified Geneva score, consider D-dimer to screen for pulmonary thrombosis
- Troponin if suspicious for myocarditis

Tests to Consider

- Assess oxygen saturation at rest and with exertion
- If lasting more than 8 weeks, consider:
  - 2-view chest x-ray (CXR)
  - Electrocardiogram (EKG)
  - Pulmonary function tests (PFT)

PACT Management to Consider

- ICD-10 Code: U09.9, Post-COVID-19 condition, unspecified
- Supplemental oxygen
- Pharmacologic therapies, including oral corticosteroids, inhaled bronchodilators, and inhaled corticosteroids, are not *routinely* recommended for breathing discomfort in the absence of a specific diagnosis such as asthma
- Heart healthy diet
- Stress management
- Diaphragmatic Breathing

Consults to Consider

- Pulmonary: Persistent hypoxia at 6 weeks or abnormal work-up; otherwise >12 weeks with persistent symptoms
- Cardiology: Abnormal EKG, stress test, or highly suspicious for cardiac etiology
- Pulmonary rehabilitation: After prerequisite clinical assessment for CAD, hypoxia, and participation (orthostatic hypotension) while excluding post-exertional malaise
- Ear, Nose, Throat (ENT) or Speech Language Pathology: concurrent dysphonia or dysphagia
- Physical Therapy: titrated return to individualized activity program (Appendix B) if no post-exertional malaise
- Occupational Therapy: regulated breathing during daily task engagement in home and the community
- Whole Health System approach: health coaching

FATIGUE AND ACTIVITY INTOLERANCE

This provides suggestions as you engage in shared health care decision-making with Veterans. It is not intended to replace clinical judgement.

Fatigue is one of the most common Long COVID related signs and symptoms in multiple studies, with an incidence of 63% in those hospitalized [29] (AAPM&R, 2022) and 46% in those not hospitalized.[30] (Stavem K, 2021)

Things to Keep in Mind

- Assess the Veteran's prior level of function (independence with activities of daily living (ADLs), working hobbies, exercising), current level of function, and recovery time from activities
- Veteran may experience post-exertional malaise, making a titrated return to individualized activity (Appendix B) important
- Screen for mental health, substance disorder, sleep disturbances
- Medication reconciliation
- Women more likely to experience fatigue at 6 months[31] (Xiong Q, 2021)
- Assess pregnancy/lactation status, review teratogenic medications

Evaluation

Labs to Consider

- Complete blood count (CBC)
- Thyroid stimulating hormone (TSH)
- B12
- Vitamin D
- Comprehensive Metabolic Panel (CMP)
- Hemoglobin A1C
- Consider:
  - Human immunodeficiency virus (HIV)
  - Hepatitis C virus (HCV)

Tests to Consider

- Ambulatory pulse oximetry
- 30 second sit to stand to evaluate functional lower extremity strength and endurance, and provide information about fall risk, activity tolerance, activity endurance, and functional mobility (Appendix C)[29] (AAPM&R, 2022)
- Evaluate other organ systems that may have been affected by COVID-19 that impact exercise participation (e.g., cardiac, pulmonary)

PACT Management to Consider

- ICD-10 Code: U09.9, Post-COVID-19 condition, unspecified
- Titrated return to individualized activity program (Appendix B)
- Diaphragmatic Breathing
- Cognitive Behavioral Therapy (CBT) for Insomnia
- Replete B12 if low
- Replete Vitamin D if low
- Consider Fish oil – 1000mg (500mg DHA/EPA) capsule combined eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) daily with food (avoid if on blood thinners or experiencing gastroesophageal reflux disease (GERD))

Consults to Consider

- Occupational Therapy for a titrated return to individualized activity program (Appendix B) and energy conservation techniques
- Physical Therapy for titrated return to individualized activity program (Appendix B)
- Physical Medicine & Rehabilitation (PM&R)
- Cardiology
- Pulmonology
- Mental Health
- Nutrition to discuss an anti-inflammatory lifestyle and diet history.
- Whole Health System approach: mindfulness, health coaching, yoga, Tai Chi, biofeedback

OMM Therapies

Pulmonary

- Dyspnea
- Cough

Musculoskeletal

- Muscle fatigue
- Myalgias

Neurological

- Headaches
- Sleep disturbances

Gastrointestinal

- Nausea
- Reflux
- Constipation

Guidance for evaluation & management

Guidance Statement AAPM&R:

Respiratory symptoms: https://onlinelibrary.wiley.com/doi/epdf/10.1002/pmrj.12744

Cardiovascular symptoms: https://onlinelibrary.wiley.com/doi/10.1002/pmrj.12859

Cognitive symptoms: https://onlinelibrary.wiley.com/doi/epdf/10.1002/pmrj.12745

Fatigue symptoms: https://onlinelibrary.wiley.com/doi/abs/10.1002/pmrj.12684

Vaccine effect on Long COVID

Cambridge study December 2022:

- Analyzed 10 studies from December 2019 to April 2022
- Compared outcomes vaccinated/unvaccinated for 1.6 million people
- Symptoms present after 3 weeks of COVID infection
- 35% effective if vaccine received before COVID infection
- 27% effective if received post infection vaccine

Study of healthcare workers in Israel found vaccine breakthrough cases were generally mild or asymptomatic, but 19% (7/36) had persistent symptoms at 6 weeks in the setting of the alpha variant

UK Case Control study (N=906) breakthrough cases are less like to report prolonged symptoms (> 28days) compared to unvaccinated

Daily Update for the United States

Cases

New Cases (Weekly Total)

259,339

Case Trends

Dec 2022 Feb 2023

Deaths

New Deaths (Weekly Total)

2,838

Death Trends

Dec 2022 Feb 2023

Hospitalizations

New Admissions (Daily Avg)

3,571

Admission Trends

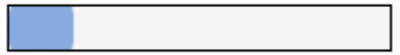
Dec 2022 Feb 2023

Vaccinations

% with Updated Booster Dose

16.0%

Total Population



Total Cases	Total Deaths	Current Hospitalizations	Total Updated Booster Doses
102,998,014	1,113,254	22,205	52,965,291

CDC | Data as of: February 17, 2023 2:55 PM ET. Posted: February 17, 2023 4:11 PM ET

Potential Treatment Under Investigation

- Guanfacine/N-acetylcysteine
- Naltrexone
- Anhydrous Enol Oxaloacetate
- Other

Long COVID and disability

- Long COVID under American with Disability Act (ADA)
  - Physical or mental impairment
  - Can substantially limit one or more major life activities

- Size of pandemic, even 1% disability will have an impact

Ongoing Research

NIH RECOVER initiative includes several studies about the long term, ongoing health effects experienced in people after COVID-19

- Includes study Gestational Research Assessments of COVID-19 (GRAVID) Study for those who experienced a COVID infection while pregnant.
- Longitudinal Study of COVID-19 Sequelae and immunity (RECON-19) investigates long term medical issues experienced by people after recovering from COVID-19
- Cardiac Magnetic Resonance Tissue Characterization in COVID-19 Survivors is a 3 year study to assess long term effect of COVID on the heart.
- Observational Study of Neurological Function after COVID-19 Infection will assess nervous system of patients with ongoing post COVID neurological symptoms.

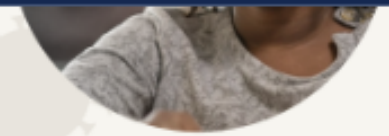
ICD-10-CM U09.9 Post COVID-19 condition, unspecified

RECOVER
Researching COVID to Enhance Recovery

En Español

HOME | WHAT IS LONG COVID? | RESEARCH | NEWS & EVENTS | ABOUT THE INITIATIVE

Find and join a RECOVER study



RECOVER Enrollment Summary

Last updated: February 24, 2023

Active Enrollment in RECOVER Observational Studies

Goal: 15,039

11,649

Adult Enrollment (non-Pregnant)

Goal: 2,451

1,461

Pregnant Adult Enrollment

Goal: 6,000

2,849

Pediatric Enrollment

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