

POST COVID CONDITION THE OCC MED LENS

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OUTLINE

Clinical presentation Risk and prevalence Biological plausibility Treatment pearls Occupational challenges and strategies

VIGNETTE

ICU Nurse

COVID-19 6 weeks ago

No hospitalization

Symptoms: Fatigue & post exertional malaise Brain fog Rapid heart and dizziness Anxiety

Off work for 1.5 months



WHAT IS POST COVID CONDITION

CARP POPULATIO N

Fatigue 80%

Respiratory 59%

Neurologic 59%

Cognitive impairment 45%

Sleep disturbance 30%

Mental health sx 26%

Vanichkachorn G, Vanichkachorn.greg@mayo.edu, Newcomb R, et al. Post COVID-19 Syndrome (Long Haul Syndrome): Description of a Multidisciplinary Clinic at the Mayo Clinic and Characteristics of the Initial Patient Cohort. *Mayo Clinic Proceedings*. 2021;0(0)doi:10.1016/j.mayocp.2021.04.02

Tinnitus

Prolonged loss of taste and smell

CARP POPULATIO N UNIQUE SX

Hair shedding (telogen effluvium)

Syncope

Sinus discomfort

GI Symptoms

RISK FACTORS

Aug 2023

3094 patients

Severe/very severe acute COVID

Hospitalization

Female gender

Psychological stress

1. Munipalli B, Ma Y, Li Z, et al. Risk factors for post-acute sequelae of COVID-19: survey results from a tertiary care hospital. J Investig Med. Aug 12 2023:10815589231190560. doi:10.1177/10815589231190560

RISK FACTORS

August 2022

732 Patients

56% reported mild or asymptomatic acute infection

MAYO: 75% not hospitalized

Group	Odds of Long COVID
Moderate	3.01
infection	(95% CI 1.21, 7.47)
Severe	3.62
infection	(95% CI 1.31, 10.03)

Moy FM, Hairi NN, Lim ERJ, Bulgiba A. Long COVID and its associated factors among COVID survivors in the community from a middle-income country-An online cross-sectional study. *PLoS One*. 2022;17(8):e0273364.

DOES VACCINATION MAKE A DIFFERENCE?

Symptom	Not vaccinated	Vaccinated	P-value
Abdominal pain*	77 (33.2%)	46 (18.8%)	0.0003
Anosmia	64 (27.6%)	44 (18.0%)	0.0120
Parosmia	70 (30.2%)	56 (22.9%)	0.0701
Chest pain/tightness	130 (56.0%)	105 (42.9%)	0.0040
Dizziness when standing	129 (55.6%)	108 (44.1%)	0.0119
Numbness & tingling	109 (47.0%)	84 (34.3%)	0.0047
Shortness of breath	142 (61.2%)	122 (49.8%)	0.0122
Spells/tremors	64 (27.6%)	48 (19.6%)	0.0395
Weakness	146 (62.9%)	123 (50.2%)	0.0051

1.Vanichkachorn G, Gilman E, Ganesh R, et al. Potential reduction of post-acute sequelae of SARS-CoV-2 symptoms via vaccination. J Investig Med. Aug 23 2023:10815589231191812. doi:10.1177/10815589231191812

Approximately 1 in 5 adults

ages 18+ have a health condition that might be related to their previous COVID-19 illness, such as:



Talk to your health care provider if you have symptoms after COVID-19



bit.ly/MMWR7121 MAY 24, 2022 * Adults aged 65 and older at increased risk



Among People Who Have Had COVID, the Percentage who Currently Have Long COVID is Declining

Percentage of people reporting that they currently have or ever had long COVID among those who have had COVID as of January 16, 2023



for Health Statistics, asked respondents whether they had any symptoms of COVID that had lasted longer than 3 months. This figure reports the findings as of 6/13/2022, 8/8/2022, 10/17/2022, and 1/16/2023. SOURCE: National Center for Health Statistics. Post-COVID Conditions. Data accessed Jan 26, 2023. Available from: https://data.cdc.gov/d/gsea-w83j.

1.KFF. Rates of Long COVID in the U.S. Have Declined Since June of 2022 | KFF. https://www.kff.org/coronavirus-covid-19/press-release/rates-of-long-covid-in-the-u-s-have-declined-since-june-of-2022/



DEJA VU

1918 Spanish Flu

 1000 patients, 20% had ongoing symptoms

2016 Ebolavirus

• Fatigue in 28%

Epstein-Barr virus

• Fatigue 38% at 2 months

SARS 2003

1.

• Fatigue in 60% at 12 months

Post-viral fatigue and COVID-19: lessons from past epidemics

2. Post-COVID-19 fatigue as a major health problem: a cross-sectional study from Missouri, USA

PERSISTENT VIRAL PROTEINS

Feb 2023
+/-PASC (n=33/14)
Absent in controls
PASC+ levels similar to acute infection
No difference in vaccination status

	PASC-	PASC+
Viral RNA	28%	59%
Spike Protein	28%	64%
Both present?	0%	33%

1.Craddock V, Mahajan A, Spikes L, et al. Persistent circulation of soluble and extracellular vesicle-linked Spike protein in individuals with postacute sequelae of COVID-19. *J Med Virol. Feb* 2023;95(2):e28568. doi:10.1002/jmv.28568

LACTATE DEHYDROGE NASE

Sep 2023 Meta analysis

46 studies/8289 participants

Inflammatory marker

Associated with pulmonary fibrosis

Elevated LDH associated with:

• Respiratory PCC

• Cardiac PCC

1.Udeh R, Utrero-Rico A, Dolja-Gore X, Rahmati M, Mc EM, Kenna T. Lactate dehydrogenase contribution to symptom persistence in long COVID: A pooled analysis. *Rev Med Virol. Sep 14 2023:e2477. doi:10.1002/rmv.2477*

IMMUNE SYSTEM CHANGES AND BRAIN FOG

October 2023 Compared NC- and NC+ 1642 patients 60% reported NC+

Noted Risk Factors Preexisting mental health conditions Female gender 45-65 age

	Without BF	With BF	P value
IgG	10.91	10.05	<0.0001
IgG1	5.9	5.3	<0.0001
IgG3	0.73	0.54	0.006
CRP	4.8	4.6	0.7

1.Lam GY, Damant RW, Ferrara G, et al. Characterizing long-COVID brain fog: a retrospective cohort study. J Neurol. Oct 2023;270(10):4640-4646. doi:10.1007/s00415-023-11913-w

COUNTER EVIDENCE

- Aug 2022
- 171 patients
- Rare objective evidence
- Elevated levels of somatization
- Associated with pre-existing psychiatric conditions





TREATMENT PROCESS OVERVIEW

Post Acute Phase (0-4 weeks post infection)

-Check for complications -Ensure hydration and nutrition -Educate on paced activity -Address return to work

Early PCS/PASC Phase 5-12 weeks

-Continue graded activity increases, minimizing post exertional malaise -Addtional testing and treatment as needed -Monitor functional improvements -Address return to work

PCS/PASC Phase >12 weeks

Possible longer recovery course, up to a year
Develop coping skills
Education on central sensitization
Uses experts in chronic fatigue and fibromyalgia



STEP 1: PSYCHOSOCIAL SUPPORT

- -Patients feel "lost"
- -Guilt/self doubt/fear
- -Clinical depression/anxiety/PTSD
- LISTEN AND VALIDATE

Li Z, Zheng C, Duan C, et al. Rehabilitation needs of the first cohort of post-acute COVID-19 patients in Hubei, China. *Eur J Phys Rehabil Med.* 2020;56(3):339-344



STEP 2: INITIAL DIAGNOSTICS

CBC

CMP

Thyroid

Iron studies

Vitamin B12

HgbA1c



STEP 3: TARGETED EVALUATIONS



COMMON CONDITIONS WITH LONG COVID

•myocarditis/ pericarditis

•high blood pressure

• shortness of breath

• pulmonary fibrosis

headaches

• prolonged loss of taste and smell

• autonomic dysfunction such as postural tachycardia syndrome

anxiety

• depression

• PTSD

STEP 4: REHABILITATI ON

-COVID-19 Fatigue
41% reduced exercise capacity
Hard to walk any distance
Trouble with stairs
Limited lifting
Limited screen tolerance

-Rooney S, Webster A, Paul L. Systematic Review of Changes and Recovery in Physical Function and Fitness After Severe Acute Respiratory Syndrome-Related Coronavirus Infection: Implications for COVID-19 Rehabilitation. *Phys Ther.* 2020;100(10):1717-1729

-George PM, Barratt SL, Condliffe R, et al. Respiratory follow-up of patients with COVID-19 pneumonia. *Thorax*. Aug 2020;doi:10.1136/thoraxjnl-2020-215314





REHABILITATION

Post Exertional Malaise

Also seen in ME/CFS

After physical stress 30% reported fatigue, flu like sx, muscle pain

Graded exercise
Negative effect in 54-74% of patients

-Geraghty K, Hann M, Kurtev S. Myalgic encephalomyelitis/chronic fatigue syndrome patients' reports of symptom changes following cognitive behavioural therapy, graded exercise therapy and pacing treatments: Analysis of a primary survey compared with secondary surveys. *J Health Psychol.* 2019;24(10):1318-1333

-Chu L, Valencia IJ, Garvert DW, Montoya JG. Deconstructing post-exertional malaise in myalgic encephalomyelitis/ chronic fatigue syndrome: A patient-centered, cross-sectional survey. *PLoS One.* 2018;13(6):e0197811.



REHABILITAT ION

-Rehabilitation \neq exercise

-Use Adaptive Paced Therapy

"START LOW AND GO SLOW"

Not simply "stop when it hurts"

Gradual increases (i.e., 10 min to 13 min of walking)

Applies to both mental and physical activities, including work.

TABLE Z. Treatment of Post-CUVID Conditions

Categories	Examples	Comments	Indications	Doses
Medications	Duloxetine	Serotonin-norepinephrine reuptake inhibitor	Useful for treating headaches, neuropathic symptoms, mood disorders, and poor sleep	Start 20 mg by mouth daily for 1 week, then 40 mg daily for 1 week, then 60 mg daily
	Nortriptyline	Tricyclic antidepressant	Useful for treating neuropathic symptoms, low mood, and poor sleep	Start 25 mg by mouth at bedtime and titrate to effect
	Trazadone	Antagonizes serotonin 5-HT2A/C and α ₁ -adrenergic receptors; inhibits serotonin reuptake	Useful for treating poor sleep	25-50 mg by mouth at bedtime
	Gabapentin	Blocks voltage-dependent calcium channels, modulating excitatory neurotransmitter release	Useful for treating neuropathic symptoms and poor sleep	Start 300 mg by mouth for 1 day, then 300 mg twice daily for 1 day, then 300 mg 3 times daily, then titrate to effect
	Naltrexone ^b	Antagonizes various opioid receptors	Has demonstrated some success for treating postviral fatigue at a dose of 4.5 mg	3-6 mg by mouth at bedtime
	Aripiprazole ^b	Antagonizes D2 and serotonin 5-HT1A/5-HT2A receptors	Has demonstrated some success for treating postviral fatigue	I-2 mg by mouth daily

1. M, R G, RT H, TJ B. Post-COVID Conditions. Mayo Clinic proceedings. 2023 Jul 2023;98(7)doi:10.1016/j.mayocp.2023.04.007

NALTREXON F

Low dose

Impacts immune system

- Chron's Disease
- Fibromyalgia
- Multiple Sclerosis

Ireland study

- 36 patients
- 1-3mg over three months
- Improvement in function, energy, sleep, concentration and **pain**

Limits

- No control
- Not blinded
- Small population

O'Kelly B, Vidal L, McHugh T, Woo J, Avramovic G, Lambert JS. Safety and efficacy of low dose naltrexone in a long covid cohort; an interventional pre-post study. *Brain Behav Immun Health.* 2022;24:100485.





OCCUPATIONAL CHALLENGES FUNCTIONAL DECLINE

34% impaired ADLS

82% impaired IADLS

63% returned to work in some form

- Average time to between infection and presentation was 3 months
- 46% (29/63) were back at baseline work

CARP POPULATION FUNCTION

PROGNOSIS

-530 patients at Weil Cornell Medicine

-Follow up at 12 months

	12 months
Worse health	41.5%
Persistent symptoms	44.2%
Trouble lifting/carrying groceries	36.5%
Limited ability to climb a flight of stairs	38.1%
Troubles walking one block	22.1%

Adapted from Huang L, Yao Q, Gu X, et al. 1-year outcomes in hospital survivors with COVID-19: a longitudinal cohort study. *The Lancet*. 08/28/2021 2021;398(10302):747-758. doi:10.1016/s0140-6736(21)01755-4

Figure 2

Fewer than Half of Working Age Adults with Long COVID Who Worked Prior to Infection Work Full-Time After Infection

Employment status of working age adults (percent of population) for all adults in 2019 (Current Population Survey) and for survey respondents who worked prior to COVID infection (average of two surveys)



NOTE: KFF Analysis of: Katie Bach, "Is 'Long COVID' Worsening the Labor Shortage?" Brookings (Jan 1, 2022); Hannah E. Davis and others, "Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact, The Lancet, v. 38 (August 1, 2021); Workers' Experiences of Long COVID: A TUC Report (June 2021); and US BLS Labor Force Statistics from the Current Population Survey (2019). PNG

KFF

OCCUPATIONAL CHALLENGES SAFETY

CARP POPULATIO N

Fatigue 80%

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Brain Fog 45%

Sleep disturbance 30%

Mental health sx 26%

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<section-header>WHAT IS BRAIN FOG? SUBJECTIVELY •Short term memory •Word finding

OBJECTIVELY

February 2022

60 patients

Multidisciplinary assessment Quality of life Psychiatric Neuropsychological battery Medical

	Long COVID Group (n=32)	Control (n=28)
Below normal scores on NP	8/11 domains	1/11 domains
% extremely low scores	28% (n=12)	14% (n=4)

Ferrando SJ, Dornbush R, Lynch S, et al. Neuropsychological, medical and psychiatric findings after recovery from acute COVID-19: A cross-sectional study. *J Acad Consult Liaison Psychiatry*. 2022.





OCCUPATIONAL CHALLENGES NO STANDARDS

WHAT IS POST COVID CONDITION?

-No universal definition

World Health Organization - 10/6/2021
A history of probable or confirmed SARS COV-2 infection
Sx ≥ 3 months from onset of infection
Sx ≥ 2 months
Can't be explained by an alternative diagnosis

CDC Definition
□ Call it "Post-COVID Conditions"
□ ≥ 4 weeks from acute infection start (symptoms or test)

 Organization WH. A clinical case definition of post COVID-19 condition by a Delphi consensus. Accessed 10/6, 2021. <u>https://www.who.int/publications/i/item/WHO-2019-nCoV-Post_COVID-19_condition-Clinical_case_definition-2021.1</u>

2. @CDCgov. Post-COVID Conditions: Information for Healthcare Providers. @CDCgov. Updated 2021-09-10T04:38:34Z. https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/post-covid-conditions.html



PANDORAS BOX

No single objective test for diagnosis.

No clear symptom presentation groups.

WHO REALLY HAS LONG HAUL COVID?

OCCUPATIONAL CHALLENGES: EMPLOYER UNCERTAINTY

EMPLOYER EXPERIENCE

EXAMPLE: LOW BACK INJURY

Work restriction and limitations

Temporary Alternative Duty

Job Rotations

Culture of support





WHAT IS REASONABLE FOR LONG COVID?



WORK TITRATION



TITRATED WORK HOURS

Hard for employers to offer only 12 hours of work per week

SIMULATE

Household chores

□ Volunteer activities



COMMUNIC ATION

"I haven't talked to my employer for 2 months"

Be proactive

Work status every 2-4 weeks

Use messaging between visits

Employers should ask for regular work status updates

REMOTE WORK

Control environment

Self pace (4 hours of work in 8 hour day)

Clear communication not indications of long-term remote work

SYMPTOM SPECIFIC RECOMMENDATIONS EXAMPLES

SYMPTOMS	RECOMMENDATION
Fatigue	"Self pace" or "no pace sensitive work" Limit weight manipulation/standing/walking Provide options for sitting
Mental fatigue/Brain fog	Provide quiet work environment Limit multitasking
Sleep disturbance	Avoid early morning start time
Hoarseness	Limit required speaking
Shortness of breath	Reduce exposure to irritating environments and exertion. Avoid temperature and humidity extremes

3 IMPORTANT ASSOCIATED CONDITIONS Mental Health

Mental Health

Anxiety, Depression, PTSD
Therapy
Medications (i.e. antidepressants, sedatives)

Sleep Disturbance Too much/too little Obstructive sleep apnea

Neurological impairment
Disturbed taste and smell
Dysfunction in 36.6%
5% still having sx at 6 months



-JR L, CM C-E, E B, et al. Prevalence and 6-month recovery of olfactory dysfunction: a multicentre study of 1363 COVID-19 patients. *Journal of internal medicine*. 2021 Aug 2021;290(2)doi:10.1111/joim.13209

SAFETY



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https://www.mayoclinic.org/appointments

Appointment number: 507-538-1377

https://connect.mayoclinic.org/blog/post-covid-recovery/