



# Recovering from COVID-19 Infection: Rehab Considerations

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**Pan Northern Clinical Rounds**  
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## Objectives:

1. Name some of the long-term complications of COVID in older adults
2. Understand the scope of post COVID rehab & describe the different patient profiles who may need post COVID rehab
3. Outline the components of an existing outpatient virtual COVID model & clinical approach to planning rehabilitation





# Disclosures

Nothing to disclose





Understand the scope of  
post COVID rehab &  
describe the different  
patient profiles who may  
need rehab post COVID



# Terminology

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Long COVID-19

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Post-acute COVID-19

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Persistent COVID-19 symptoms

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Chronic COVID-19 illness

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Post-COVID-19 manifestations

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Long-term COVID-19 effects

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Post COVID-19 symptoms

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Ongoing COVID-19

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Long-haulers

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Post-acute sequelae of SARS-CoV-2 infection (PASC)

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Long-COVID-19

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**Table 3.** A definition of post COVID-19 condition

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\* and 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.

*Notes:*

There is no minimal number of symptoms required for the diagnosis; though symptoms involving different organs systems and clusters have been described.

\*A full list of described symptoms included in the surveys can be found in Annexes 2 .

*Definitions:*

Fluctuate – a change from time to time in quantity or quality.

Relapse – return of disease manifestations after period of improvement.

Cluster – two or more symptoms that are related to each other and that occur together. They are composed of stable groups of symptoms, are relatively independent of other clusters, and may reveal specific underlying dimensions of symptoms (32).

Global >  Canada

Overview

Measures

Table View

Data

More Resources



In **Canada**, from **3 January 2020** to **5:47pm CEST, 29 April 2022**, there have been **3,725,779 confirmed cases** of COVID-19 with **39,012 deaths**, reported to WHO. As of **22 April 2022**, a total of **81,722,003 vaccine doses** have been administered.



Conservative estimates:

**10% of all cases will exhibit symptoms for a period of 12 weeks or longer**

- Greenhalgh et al (2020)
- Office for National Statistics

**Potential rehab outpatients  
in Canada:  
>372,000**



# Understanding the Post COVID-19 Condition (Long COVID) and the Expected Burden for Ontario



## Key Message

The “post COVID-19 condition” (or long COVID) describes a range of symptoms which can persist for months after severe, mildly symptomatic or asymptomatic SARS-CoV-2 infection. The most common of more than 200 reported symptoms include fatigue, shortness of breath, pain, sleep disturbances, anxiety, and depression.

Many people with the post COVID-19 condition have difficulty returning to baseline levels of function and have high rates of health care utilization. A conservative estimate suggests that 57,000 to 78,000 Ontarians had or are currently experiencing the post COVID-19 condition, although prevalence estimates can vary widely depending on the case-definition applied. Vaccination is likely protective against development of the post COVID-19 condition.

More research is required to develop a consensus definition of the post COVID-19 condition, understand risk factors including the role of viral variants, quantify the impact on specific populations such as children, and develop strategies for prevention and treatment.

Over 100 symptoms, sequelae or difficulties conducting usual activities were reported

### Short Term (4-12 weeks after COVID-19 diagnosis)

Approximately **4 in 5** individuals (83%) reported the persistence or **presence of one or more symptoms** in the **short-term**

- Fatigue
- General pain or discomfort
- Shortness of breath
- Sleep disturbances
- Anxiety
- Cough

Fifty-two percent of individuals reported feeling ill or not back to full health in the short-term

### Long Term (>12 weeks after COVID-19 diagnosis)

Approximately **3 in 5** individuals (56%) reported persistence or **presence of one or more symptoms** in the **long-term**

- Fatigue
- General pain or discomfort
- Sleep disturbances
- The following symptoms had similar prevalence (22%-23%):
  - anxiety or depression,
  - depression or post-traumatic stress disorder (PTSD)
  - shortness of breath
  - hair loss



## Acute Complications of COVID-19

### **Neuropsychiatric**

- Cerebrovascular accident
- Large vessel disease
- Encephalopathy, delirium
- Anosmia, ageusia

### **Respiratory**

- Pneumonia
- Hypoxemic respiratory failure, ARDS

### **Cardiovascular**

- Arrhythmia
- Myocarditis

### **Hematologic, Vascular**

- Coagulopathy
- Thrombotic events

### **Renal**

- Acute kidney injury

### **Gastrointestinal, Hepatobiliary**

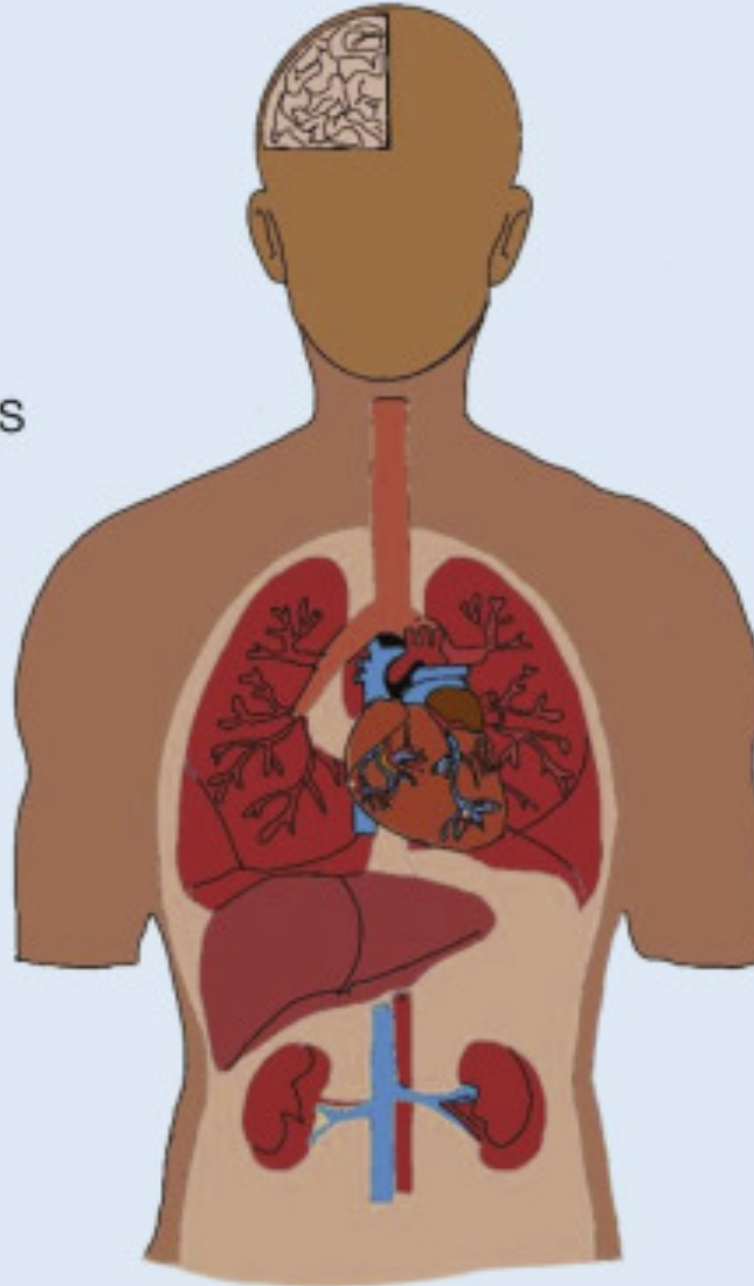
- Diarrhea
- Acute liver injury

### **Musculoskeletal**

- Rhabdomyolysis

### **Dermatologic**

- Livedo reticularis
- Maculopapular or urticarial rash



## Post-COVID Symptoms, Sequelae

### **Neuropsychiatric**

- Neurocognitive deficits
- Mood changes
- Sensory & motor deficits
- Chronic fatigue and sleep disruption

### **Respiratory**

- Persistent dyspnea
- Chronic cough

### **Cardiovascular**

- Chest pain
- Palpitations

### **Hematologic, Vascular**

- Persistent or recurrent thrombosis

### **Renal**

- Chronic kidney disease

### **Gastrointestinal, Hepatobiliary**

- Persistent liver dysfunction

### **Musculoskeletal**

- Muscle wasting
- Weakness
- Deconditioning

### **Dermatologic**

- Hair loss



Severe: ICU survivors











Moderate: Hospitalized



Mild: Community Treated

Profiles of patients needing rehab

| Severity  | Complications  | Rehabilitation Needs  | Rehab setting  |
|---|--|---|--|
| <b>Mild</b><br>(not hospitalized)   |  Respiratory Compromise<br>Cardiovascular deconditioning<br> MSK Complications: joint pain<br>Neurological sensory symptoms<br> Headaches<br>Brain Fog<br> Anxiety and PTSD | <ul style="list-style-type: none"> <li>• Testing &amp; individual exercise prescription</li> <li>• Range of Motion</li> <li>• Self Management of symptoms</li> <li>• Pacing/Energy conservation</li> <li>• Counselling and Cognitive Behaviour therapy</li> </ul> | Outpatient or<br>Virtual care<br>+/- hybrid model  |
| <b>Moderate</b><br>Hospitalized but no ICU<br>(approx. 6-7% of population)    | Similar to Mild with increased severity of disability  | <ul style="list-style-type: none"> <li>• Reconditioning</li> <li>• Mobility retraining</li> <li>• Balance and Stairs</li> </ul>   | Inpatient for elderly frail<br><br>Outpatient  |
| <b>Severe</b><br>ICU ventilation & Acute Respiratory Distress Syndrome (1-3%) |  Respiratory Compromise<br>ICU neuropathy<br> Steroid Myopathy<br>Cardiomyopathy<br> Anoxic Brain injury<br>COVID related Strokes<br> PTSD                          | <ul style="list-style-type: none"> <li>• Retraining in Self Care</li> <li>• Muscle strengthening</li> <li>• Gait Training</li> <li>• Aerobic Exercise</li> <li>• Cognitive rehab</li> <li>• Motor retraining</li> <li>• Neuropsychiatry</li> </ul>                | Inpatient rehab<br><br>May require specialized brain injury or stroke rehab<br><br>Slide credit: Dr. M. Bayley |

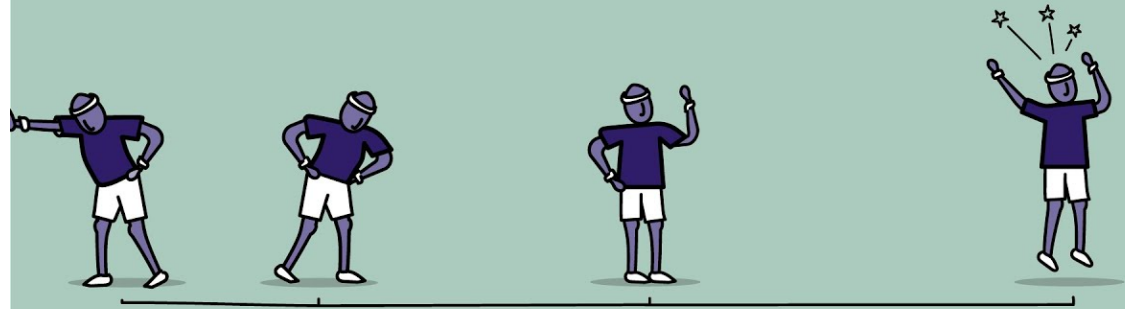


# Systems Checklist

|  |  |
|--|--|
| Patient Name: _____  |  |
| <b>Musculoskeletal</b>   |  |
| <input type="checkbox"/> Overwhelming fatigue<br><input type="checkbox"/> Muscle atrophy/deconditioning<br><input type="checkbox"/> Neuropathy<br><input type="checkbox"/> Mobility<br><input type="checkbox"/> Reduced range of movement  | <input type="checkbox"/> Edema<br><input type="checkbox"/> Pain, location: _____<br><input type="checkbox"/> Post intubation <ul style="list-style-type: none"> <li><input type="checkbox"/> swallowing and feeding needs</li> <li><input type="checkbox"/> communication needs</li> <li><input type="checkbox"/> Voice changes</li> </ul>   |
| <b>Cardiopulmonary</b>   |  |
| <input type="checkbox"/> Breathlessness<br><input type="checkbox"/> Limited activity tolerance<br><input type="checkbox"/> Postural hypotension<br><input type="checkbox"/> Rapid oxygen desaturation during exertion  | <input type="checkbox"/> Cardiac issues (e.g. atrial fibrillation and arrhythmias)<br><input type="checkbox"/> Dysfunctional breathing patterns (e.g. hyperventilation)  |
| <b>Neurological</b>  |  |
| <input type="checkbox"/> Delirium<br><input type="checkbox"/> Cognitive issues <ul style="list-style-type: none"> <li><input type="checkbox"/> Attention (poor concentration)</li> <li><input type="checkbox"/> Memory issues (memory of admission, short-term or working memory)</li> <li><input type="checkbox"/> Visuospatial issues</li> <li><input type="checkbox"/> Difficulty following instructions</li> </ul> | <input type="checkbox"/> Balance<br><input type="checkbox"/> Critical illness neuropathy / myelopathy<br><input type="checkbox"/> Reduced wakefulness<br><input type="checkbox"/> Perceptual issues (e.g. vision, hearing)<br><input type="checkbox"/> Insight/awareness of condition<br><input type="checkbox"/> Behavioral changes (e.g. impulsivity/ disinhibition)<br><input type="checkbox"/> Dysphasia |
| <b>Psychosocial</b>  |  |
| <input type="checkbox"/> Loss of confidence and trust in own body<br><input type="checkbox"/> Fear or anxiety<br><input type="checkbox"/> Low mood, depression<br><input type="checkbox"/> Grief   | <input type="checkbox"/> Difficulty adjusting to change<br><input type="checkbox"/> Exacerbation or relapse of existing mental health conditions<br><input type="checkbox"/> Post-traumatic stress disorder  |
| Other: _____   |  |

Understand the  
nature of  
rehabilitation  
services  
required

## Covid-19: The Road to Recovery



# Rehabilitation in the Management of COVID-19

**Rehabilitation** is being recognized as a pivotal aspect of the **post-acute COVID response**

For COVID patients, **rehabilitation** can:

- **improve functional capacity**
  - **address the effects of deconditioning** after prolonged ICU stays
  - **alleviate stress** by providing patients with needed support throughout recovery
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- This can facilitate patients' **return to home & vocational activities**
  - Rehabilitation has been described as a **necessity** and **right** in the context of the COVID pandemic
  - It is recommended that it be **routinely incorporated** into pandemic response plans early, prior to widespread disability



# Providing Rehabilitation to Patients Recovering from COVID-19: A Scoping Review

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The emerging body of literature on COVID rehabilitation has begun to elucidate the **important role that rehabilitation** can play in addressing **COVID-related: declines in health, function, and well-being**

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An **individualized rehabilitation program** be provided across **the continuum of care** by an **interdisciplinary team** of professionals and that the **nature and extent of rehabilitation** be informed by the **care setting** and **COVID severity**

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Outline the components of  
an existing outpatient  
virtual COVID model &  
clinical approach to  
planning rehabilitation



# What does COVID Rehab Look Like?

- Patients are supported & empowered to manage their own health and reintegrate into the community
- Provide rehabilitation support to manage respiratory function, mobility, strength, ADL/IADLs, psychosocial well-being, communication and quality of life
- Evidence supports that both mobility and respiratory function can be managed using aerobic exercises tailored to patients' abilities, strength training and breathing exercises

**Rehabilitation and Long COVID** World PT Day 2021

**What is rehabilitation?**  
Rehabilitation is defined as a set of interventions to optimise functioning in everyday activities, support individuals to recover or adjust, achieve their full potential, and enable participation in education, work, recreation and meaningful life roles.

Safe and effective rehabilitation is a fundamental part of recovery.  
Rehabilitation for Long COVID must be tailored to the individual, depending on their symptoms, goals and preferences.

The World Health Organization recommends that Long COVID rehabilitation should include educating people about resuming everyday activities conservatively, at an appropriate pace that is safe and manageable for energy levels within the limits of current symptoms, and exertion should not be pushed to the point of fatigue or worsening of symptoms.

**How to use pacing with your physiotherapist** World PT Day 2021

Pacing is a self-management strategy during activity to avoid post-exertional symptom exacerbation (PESE). When pacing you do less activity than you have energy for, keeping activities short, and resting often.

- 1. Learn about your energy reserve/reservoir**  
• Your energy reserve is how much energy you have each day – this will vary so it is best to find your baseline by using an activity and symptom diary. Your “baseline” is what you can do fairly easily on a good day and only just do on a bad day.  
• You should always aim to leave some energy at the end of the exercise – don’t keep going until you feel tired.
- 2. Learn how much energy you have**  
• Your activity and symptom diary should start to show some patterns. You can now reduce or modify your activity levels so that you don’t trigger PESE or “crash”. This will help you find a level of activity you can maintain on both good and bad days, unless you have a relapse. Learn to recognise early signs of PESE and immediately initiate stop, rest, pace to avoid a crash.
- 3. Learn how to use the 4 Ps to help you plan your activities**  
• **Prioritise** what you really need to do in a day or week. Question whether all activities are necessary. Can someone else do it? Can I change the activity so it is easier for me?  
• **Plan** in your main prioritised tasks for the day. Plan in your rest time so the day is paced.  
• **Pacing** – break up your activity into smaller, more manageable tasks with rest breaks.

Resource: <https://world.physio/news/world-pt-day-materials-available-almost-60-languages>

# UHN-Toronto Rehab Interdisciplinary COVID Rehab Program

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## Eligibility Criteria:

- Referred from within UHN
- COVID diagnosis (positive or presumed) with ongoing symptoms affecting function / QoL

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## Referral Sources:

- CANCOV Study
- UHN COVID Connected Care Clinic
- UHN inpatient / rehab programs
- UHN Physicians / NPs

CAN  COV



*Toronto Western*  
Family Health Team

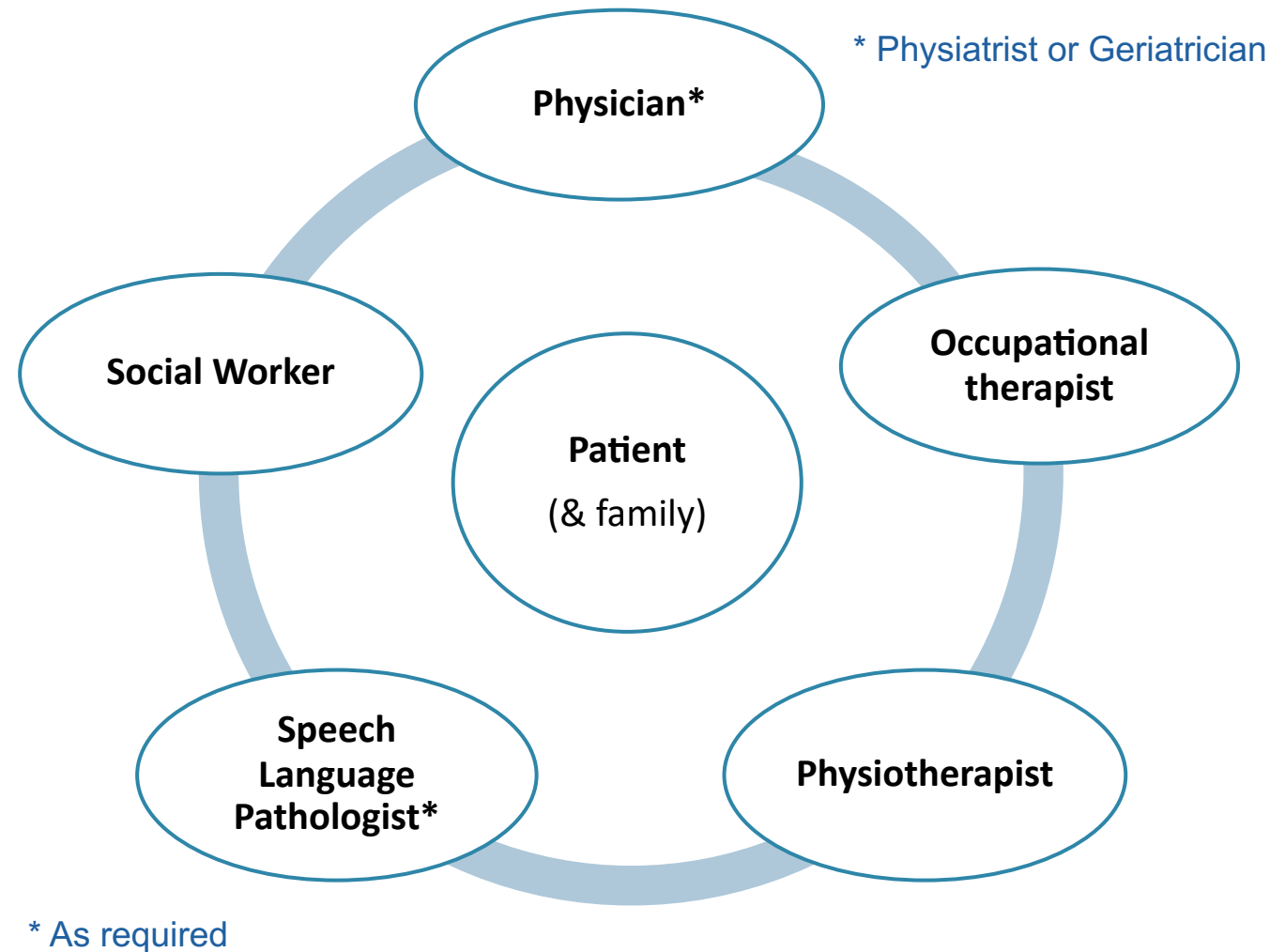
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## Referral for Additional Testing / Therapy (as required):

- |                         |           |       |
|-------------------------|-----------|-------|
| - Cardiac testing       | - PFT     | - EDX |
| - Mental health support | - Imaging | - BW  |



# Initial interdisciplinary Assessment



# Symptoms Checklist

## Top Symptoms



Overwhelming fatigue (79%)



Extreme activity intolerance (76%)



Shortness of breath (71%)



Joint pain (48%)



Cognitive changes: memory (48%), attention (40%)



Mental Health symptoms: depression (40%), anxiety (36%)



Muscle atrophy / deconditioning (38%)



Neuropathic symptoms (17%)



Cardiac Issues (14%)

# Treatment Strategies



**Energy Conservation, Fatigue Management, Pacing**



**Breathing Exercises**



**Individualized Exercise Plans – Endurance, Strength, Balance**



**Cognitive Compensation Strategies**



**Coping Strategies**



**Education & Reassurance**



**Mindfulness/CBT**



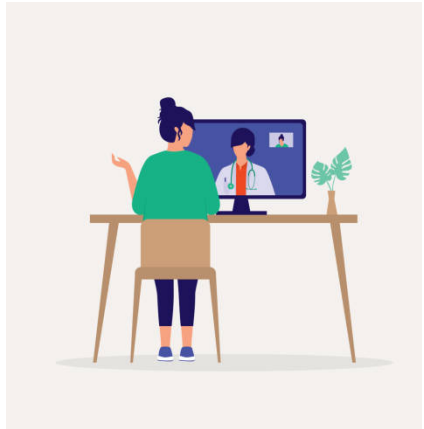
**Sleep Optimization**



**Return to Work / Community Planning**



**Swallowing & Speech Therapy**



Approach:  
rule out  
other  
causes of  
symptoms

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Rule out severe sleep disorders

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Rule out severe depression or anxiety

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Cardiac exercise test for those with severe symptoms

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Judicious use of specialized testing (ex. EMG, imaging)



# "Long covid" in primary care

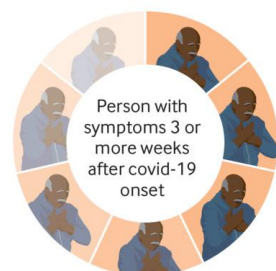
Assessment and initial management of patients with continuing symptoms

Post-acute covid-19 appears to be a multi-system disease, sometimes occurring after a relatively mild acute illness. Clinical management requires a whole-patient perspective. This graphic summarises the assessment and initial management of patients with delayed recovery from an episode of covid-19 that was managed in the community or in a standard hospital ward.

## An uncertain picture



The long term course of covid-19 is unknown. This graphic presents an approach based on evidence available at the time of publication. However, caution is advised, as patients may present atypically, and new treatments are likely to emerge



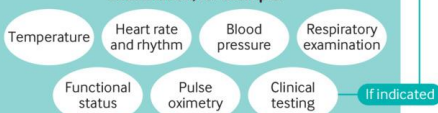
Person with symptoms 3 or more weeks after covid-19 onset

## Clinical assessment

**Full history**  
From date of first symptom

**Current symptoms**  
Nature and severity

## Examination, for example:



Assess comorbidities

Social and financial circumstances

## Investigations

Clinical testing is not always needed, but can help to pinpoint causes of continuing symptoms, and to exclude conditions like pulmonary embolism or myocarditis. Examples are provided below:

## Blood tests

Full blood count    Electrolytes  
Liver and renal function    Troponin  
C reactive protein    Creatine kinase  
D-dimer    Brain natriuretic peptides  
Ferritin — to assess inflammatory and prothrombotic states

## Other investigations

Chest x ray    Urine tests  
12 lead electrocardiogram

## Social, financial, and cultural support

Prolonged covid-19 may limit the ability to engage in work and family activities. Patients may have experienced family bereavements as well as job losses and consequent financial stress and food poverty. See the associated article by Greenhalgh and colleagues for a list of external resources to help with these problems

## Safety netting and referral

The patient should seek medical advice if concerned, for example:

Worsening breathlessness  
 $\text{PaO}_2 < 96\%$     Unexplained chest pain  
New confusion    Focal weakness

Specialist referral may be indicated based on clinical findings, for example:

➔ **Respiratory** if suspected pulmonary embolism, severe pneumonia  
➔ **Cardiology** if suspected myocardial infarction, pericarditis, myocarditis or new heart failure  
➔ **Neurology** if suspected neurovascular or acute neurological event

➔ **Pulmonary rehabilitation** may be indicated if patient has persistent breathlessness following review

## Medical management

Symptomatic, such as treating fever with paracetamol  
Optimise control of long term conditions  
Listening and empathy  
Consider antibiotics for secondary infection  
Treat specific complications as indicated

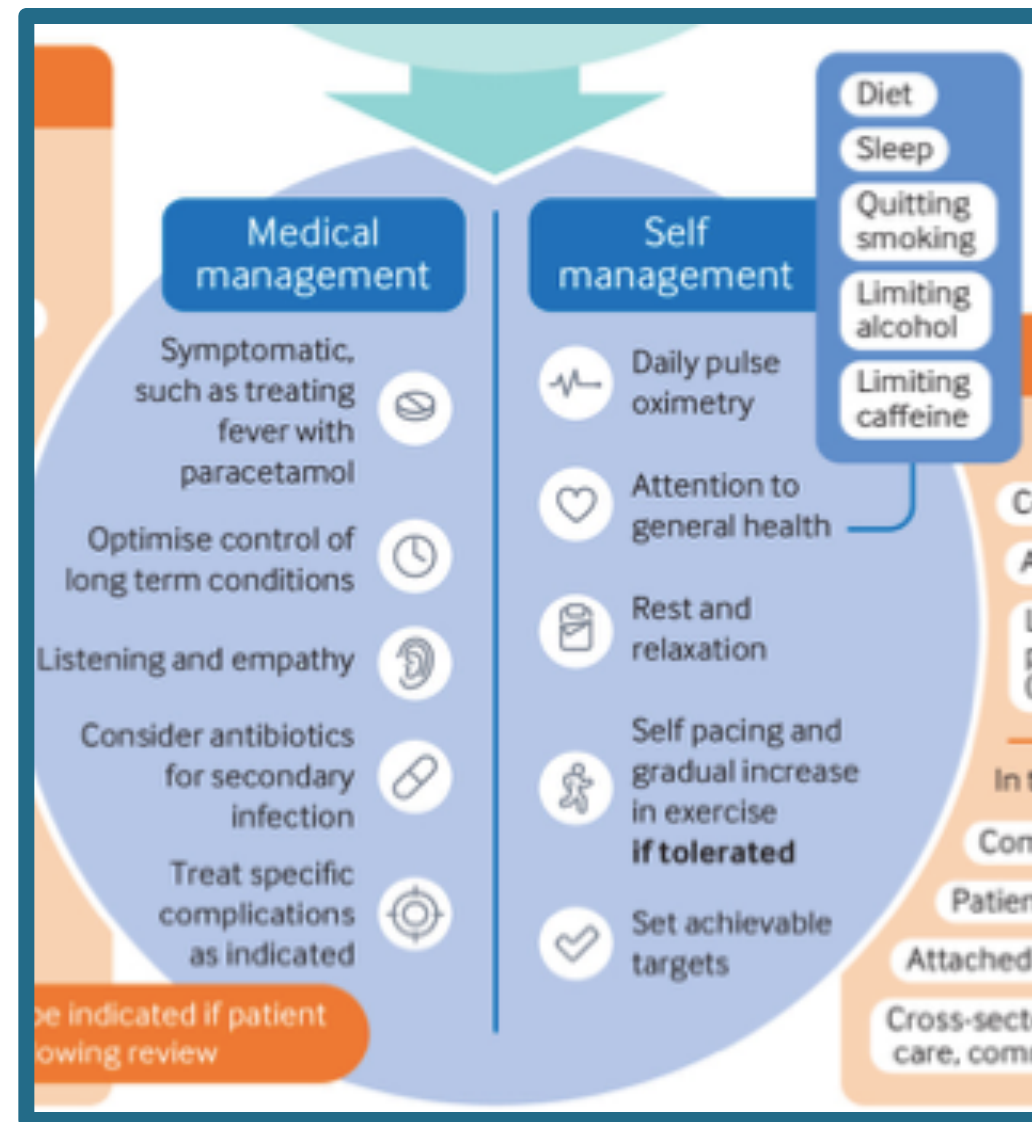
## Self management

Daily pulse oximetry  
Attention to general health  
Rest and relaxation  
Self pacing and gradual increase in exercise **if tolerated**  
Set achievable targets

Diet  
Sleep  
Quitting smoking  
Limiting alcohol  
Limiting caffeine

## Mental health

In the consultation:  
Continuity of care  
Avoid inappropriate medicalisation  
Longer appointments for patients with complex needs (face to face if needed)  
In the community:  
Community linkworker  
Patient peer support groups  
Attached mental health support service  
Cross-sector partnerships with social care, community services, faith groups



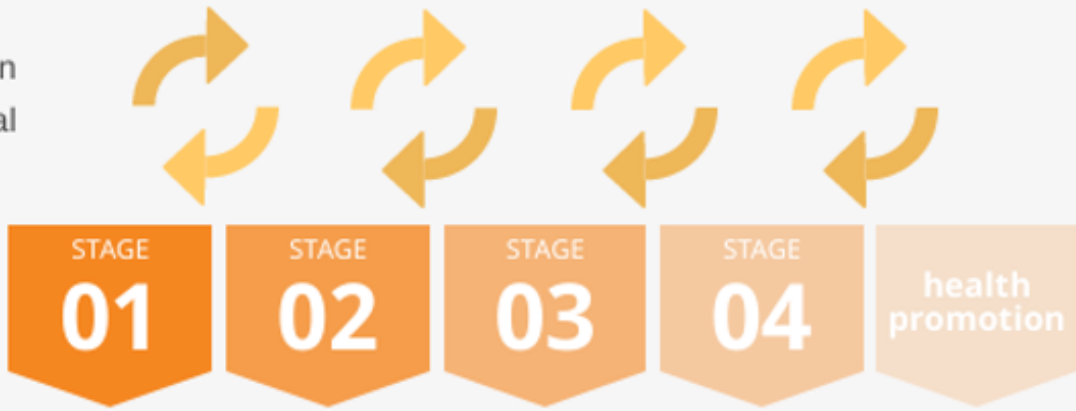


# Return to exercise in the non-athlete:

Safety advice : (stop exercise if any of the following occur)  
saturation < 96% (no history of lung disease).  
New-onset shortness of breath or chest pain / tightness / pressure sensation.  
Syncope / drop in blood pressure upon the activity.  
Drop-in oxygen saturations on exertion >3%.  
Symptoms of myocardial injury, myocarditis, or thromboembolic disease.

Exclusion criteria: Hospitalised patients, patients bedbound during infection (moderate & severe infection), or patients requiring cardiac/respiratory evaluation prior to starting exercise.

If a patient fails to progress, return back a stage and seek medical review.



|  | STAGE 01 | STAGE 02 | STAGE 03 | STAGE 04 | health promotion |
|--|----------|----------|----------|----------|------------------|
| GOAL 1<br>Monitor clinical progress    | ✓        | ✓        | ✓        | ✓        | ✓                |
| GOAL 2<br>Graduated return to function | ✗        | ✓        | ✓        | ✓        | ✓                |
| GOAL 3<br>Return to exercise           | ✗        | ✗        | ✓        | ✓        | ✓                |

|    |   |
|----|---|
| 01 | STAGE 1 - symptomatic home management.                        |
| 02 | STAGE 2 - Return to function at least 2 weeks since infection |
| 03 | STAGE 3 - Return to Exercise graduated return to exercise.    |
| 04 | STAGE 4 - Health promotion patient centred goals              |

# Rehabilitation for Clients with Post COVID-19 Condition (Long COVID)

Guidance for Canadian Rehabilitation and Exercise Professionals

## What to Screen

### Post Exertional Symptom Exacerbation

Worsening of symptoms 24-72 hours following exertion. Exertion refers to cognitive, physical, emotional, or social activity and is often minimal or at a threshold previously tolerated.

[World Physio Fatigue and PESE Infographic](#)

## How to Screen and Action Necessary

Monitor and teach clients to self-monitor for increased symptoms during and in the days following physical activity, exercise, or following emotional/ cognitive/communicative exertion. Utilize [Questionnaires](#).<sup>5</sup> Establish baseline symptoms pre-exercise. Ask clients about tolerance in the days after sessions before progressing. Use [Pacing](#) for treatment. Refer to a [physiotherapist](#) or [occupational therapist](#).

Open Access Article









### A Brief Questionnaire to Assess Post-Exertional Malaise

by [Joseph Cotler](#), [Carly Holtzman](#), [Catherine Dudun](#) and [Leonard A. Jason](#) \* [✉](#)

# Support for Rehabilitation Self-Management after COVID-19- Related Illness



This leaflet provides basic exercises and advice for adults who have been severely unwell and admitted to the hospital with COVID-19. It provides information on the following areas:

|   |  |    |                          |
|---|--|----|--------------------------|
|    | Managing breathlessness  | 2  | <input type="checkbox"/> |
|    | Exercising after leaving hospital                              | 4  | <input type="checkbox"/> |
|    | Managing problems with your voice                              | 15 | <input type="checkbox"/> |
|    | Managing eating, drinking, and swallowing                      | 16 | <input type="checkbox"/> |
|    | Managing problems with attention, memory, and thinking clearly | 17 | <input type="checkbox"/> |
|    | Managing activities of daily living                            | 18 | <input type="checkbox"/> |
|   | Managing stress and problems with mood                         | 19 | <input type="checkbox"/> |
|  | When to contact a healthcare professional                      | 21 | <input type="checkbox"/> |

# Patient Resources

World Physiotherapy Briefing Paper — Long COVID  
Physio

<https://www.longcovid.org>

<https://www.yourcovidrecovery.nhs.uk>

The Why, When and How of Pacing | Long Covid's  
Most Important Lesson

COVID-19 Recovery & Rehabilitation After COVID-19:  
Resources for Health Professionals

Long COVID Treatment: Take control of fatigue

Returning to Your Daily Activities and Exercise While  
Recovering from COVID-19

Disability and rehabilitation - Video gallery -  
Rehabilitation self-management after COVID-19

After COVID-19: Information and resources to help you  
recover

COVID-19 Resources for Specific Health Conditions

# From The Patient Perspective

“  
*Trying to find resources that support 'long haulers' like myself has been like finding the proverbial needle in a haystack. I've been tested, poked and prodded by many well meaning doctors, but none have given me any tools to help manage my physical symptoms and improve my health. That was until today.*

*I am in tears - tears of gratitude - for finally meeting with a team who not only specialize in treating patients like me, but who listened to my story and who are now putting together a customized physiotherapy and occupational therapy plan based on my needs.*

*Thank you for allowing me to feel hope!*

”



# Summary

- A **large proportion** of individuals will need **rehab** following recovery from COVID infection
- Patients require an **individualized treatment approach** to meet their specific **needs** and **rehab goals**
  - Physical, cognitive, psychosocial
- Use **principles from other populations** and extrapolate to COVID population
  - Emerging evidence / research supporting the role for multidisciplinary rehab post COVID
- We are **learning alongside our patients what it means to be COVID recovered**, even if we do not have all the answers
  - We can provide comprehensive, compassionate, multidisciplinary rehab care



# Questions?

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- <http://www.phsa.ca/health-info/post-covid-19-care-recovery>
- <https://www.youtube.com/watch?v=j8McWrSUVAU>
- [https://www.uhn.ca/PatientsFamilies/Health\\_Information/Health\\_Topics/Documents/Returning\\_to\\_activity\\_exercise\\_while\\_recovering\\_from\\_COVID.pdf](https://www.uhn.ca/PatientsFamilies/Health_Information/Health_Topics/Documents/Returning_to_activity_exercise_while_recovering_from_COVID.pdf)
- <https://www.youtube.com/watch?v=gUPvNwvkOIA>
- [https://cdn.who.int/media/docs/default-source/ageing/support-for-rehabilitation-self-management-after-covid-19-related-illness-engf5cec00b-350b-4eb0-bc24-0704df509ae1.pdf?sfvrsn=203566f0\\_1&download=true](https://cdn.who.int/media/docs/default-source/ageing/support-for-rehabilitation-self-management-after-covid-19-related-illness-engf5cec00b-350b-4eb0-bc24-0704df509ae1.pdf?sfvrsn=203566f0_1&download=true)
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