

Care and Supports for Patients with Post-Acute/Long COVID-19

Rapid Review May 26, 2021

Key Review Questions: What are the definitions and terminologies being used? What is the evidence around symptoms, risk factors and treatment options? How are other jurisdictions supporting these patients? What is the emerging evidence on care management strategies and care pathways?

Definitions and terminology:

- **There is a need for a consensus** on common definitions for patients with persistent symptoms of COVID-19 and there is currently **no agreed upon terminology**
 - Terms used include COVID-19 long haulers, long-COVID-19 and post-acute, post-COVID-19 syndrome
 - Long Covid-19 and post-acute COVID-19 seem to be preferred by clinicians and researchers. Long COVID-19 may best reflect patient experience and was coined by those affected on social media. (Nalbandian, 2021)
- Given the variability of symptoms and onset, some suggest classification systems based on symptom onset and persistence
 - Terminology most commonly grouped as symptoms lasting 4-12 weeks and >12 weeks (NICE, 2020; Nalbandian, 2021)

Long COVID-19 symptoms:

- Evidence on symptoms of post-acute COVID-19 is informed by 4 systematic reviews; 2 narrative reviews; and 4 primary articles
- The **prevalence** of post-acute COVID-19 symptoms ranged from **31% to 51%** and tended to decrease over time (Public Health Ontario, 2021)
- Post-acute COVID-19 affects multiple systems.
- **Table 1** summarizes the evidence of the most common symptoms, grouped into four categories: neurological and cognitive; respiratory; cardiovascular and other
- The most common symptoms include **headache, fatigue, dyspnea, cough, anxiety and depression, sleep disorders, smell /taste dysfunction, chest pain, joint and/or muscle pain**
- There is limited evidence in special populations, including children.

Appendix A and Appendix B

Risk factors for development of Long COVID-19:

- There is limited evidence on populations most at risk for developing post-acute COVID-19
- Some risk factors may include: **female, age (40-60), previous psychiatric history, co-morbidities, experiencing dyspnea during the acute phase** (Alberta Health Services, 2020)

Guidelines for Long COVID-19

- There were **four published guidelines** for the management of post-acute COVID-19 identified. These guidelines were published by the National Institute for Health Care Excellence (NICE, 2020), UK ; the Centers for Disease Control (US, 2021); the Catalan Society of Family and Community Medicine (2021); and the Royal Australian College of General Practitioners (2021)
 - Guidelines include recommendations for identification, assessment, care planning, management and monitoring for persons with post-acute COVID-19

Treatment and programs, and care pathways for Long COVID-19 symptoms

- Most patients recover spontaneously with support, treatment of symptoms and gradual increase in activity.
- Patients usually experience a range of symptoms or complications – so support needs to be multidisciplinary, **taking a ‘whole patient’ perspective.**
- **4 types of support may be required:**
 - Self-care resources and peer supports
 - Generalist care and rehabilitation, e.g. provided by primary care services or multidisciplinary community services
 - Specialist clinical assessment, rehabilitation and treatment may be required, e.g. for respiratory, cardiac or neurological symptoms, or specialist psychological support
 - Wider social and economic support may be required, e.g. support to access benefits whilst unable to do paid work, or support in unpaid caring role
- Options for treatments should also include **specialized clinics, educational programs, rehabilitation, and continued monitoring**
- Disease management requires longitudinal follow-up in primary care, multidisciplinary rehab services, and the empowerment of patients (Siso-Almirall et al, 2021)
- Programs are often focused on **symptom reduction and functional improvement**
- Programs may be symptom specific (e.g. pulmonary symptoms) or more general
- Special considerations may be **required for older patients, those who have been hospitalized with COVID-19, those with cognitive disabilities** (Brown, 2021; Centers for Disease Control, 2020, Provincial Health Services Authority, 2021)

Primary Health Care Pathways ([Appendix C](#)) and Multidisciplinary and COVID Clinics ([Appendix D](#))

Canadian based programs for Long COVID-19 symptoms

- There were seven Canadian based programs identified. These are more fully described in **Table**
- Public clinics and private clinics are available. Public clinics may require a referral or proof of positive test
- Virtual care and virtual support are also being utilized.

US based programs for Long COVID-19 symptoms

- A US review identified 33 hospitals and health systems that have launched COVID-19 clinics **(Error! Not a valid result for table.)**
- Clinics are multi-disciplinary and focused on individuals, patient centered care
- Clinics are often integrated into larger clinics and hospitals to facilitate access to a wide range of healthcare providers
- Many require a referral or proof of positive COVID-19 test
- There are few pediatric clinics

Table of Contents

Definitions and Terminology	7
Source 1. Chronic COVID syndrome: Need for an appropriate medical terminology for long-COVID and COVID long-haulers (Baig, 2020).	7
Source 2. Why the Patient-Made Term 'Long Covid' is needed (Perego, 2020)	7
Source 3. How and why Patients made Long COVID (Callard, 2021).	7
Source 4. Long COVID: let patients help define long-lasting COVID symptoms (Nature Editorial, October 7 th , 2020).	7
Source 5. Defining Post-COVID Symptoms (Post-Acute COVID, Long COVID, Persistent Post-COVID): An Integrative Classification (Fernández-de-Las-Peñas, 2021)	8
Source 6. Understanding Long COVID-19 (Evidence Synthesis Network, 2021)	8
Symptoms and Risk Factors	10
Source 1. Persistent Symptoms and Post-Acute COVID-19 in Adults – What We Know So Far (Public Health Ontario, April 9 th , 2021).	10
Source 2. COVID-19 Scientific Advisory Group Rapid Evidence Report (Alberta Health Services COVID-19 Scientific Advisory Group, November 23 rd , 2020).	11
Source 3. The occurrence of long COVID: a rapid review. Pan African Medical Journal (Iwu et al 2021)	13
Source 4. Post-acute COVID-19 syndrome. Nature Medicine (Nalbandian et al 2021)	14
Source 5. Long-term Health Consequences of COVID-19. JAMA. (del Rio et al, October 5, 2020)	15
Source 6. Patient Symptoms and Experience Following COVID-19: Results from a UK Wide Survey	15
Source 7. Post-COVID-19 Symptom Burden: What is Long-COVID and How Should We Manage It? Lung (Skyles et al, 2021)	17
Source 8: Attributes and predictors of Long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study App (Sudre et. al., 2020)	17
Source 9. Late Complications of COVID-19: a Systematic Review of Current Evidence. (Seyed-Alinaghi et. al., 2021)	18
Figure 1. Frequency of identified late complications.	19
Source 10. COVID-19 symptoms over time: comparing long-haulers to ME/CFS (Jason et al 2021)	19
Long COVID-19 in special populations	20
Source 1. Long-term symptoms after SARS-CoV-2 infection in school children: population-based cohort with 6-months follow-up. medRxiv. (Radtke et al 2021) **pediatric population**	20

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Guidelines on Long COVID-19	21
Source 1. COVID-19 rapid guideline: managing the long-term effects of COVID-19	21
Source 2. Post-COVID Conditions: Information for Healthcare Providers (CDC 2021)	22
Source 3. Caring for adult patients with post-COVID-19 conditions (Royal Australian College of General Practitioners, n.d.)	31
Source 4. Long Covid-19: Proposed Primary Care Clinical Guidelines for Diagnosis and Disease Management. International Journal of Environmental Research and Public Health. (Sisó-Almirall et al 2021)	32
Figure 2. A graphic proposal for the multidisciplinary care of patients with long COVID-19 in primary care. Rehab: rehabilitation, ENT: Ear, Nose and Throat, FM: fibromyalgia, CFS: chronic fatigue syndrome, NRL: neurological, Cardiovasc: cardiovascular, Psychol/psych: psychological/psychiatric.	32
Care considerations for Long COVID-19	33
1. Types of Care Management Supports (Greenhalgh et al. 2020; Crocker et al. 2021)	33
2. Primary Care	34
Source 1. Management of post-acute covid-19 in primary care. BMJ. (Greenhalgh et al, 2020)	34
3. COVID Clinics, Multidisciplinary Care and Specialty Programs	35
Source 1. Clinical Programs for the Post-Acute Sequelae of COVID-19: What do they Offer? Journal of Medicine and Public Health. (Jacobs & Baniqued, 2021)	35
Source 2. A Multidisciplinary NHS COVID-19 Service to Manage Post-COVID-19 Syndrome in the Community. (Parkin et al 2021)	36
Source 3. Evidence Synthesis Note: Long COVID Clinics. (Ontario Ministry of Health, 2021)	37
Source 4. Developing services for long COVID: lessons from a study of wounded healers. (Ladds et al., 2021)	38
Management of common sequelae of long COVID-19	39
Source 1. COVID-19 and post-infectious myalgic encephalomyelitis/chronic fatigue syndrome: a narrative review. (Poenu et al, 2021)	39
Source 2. Post-COVID 19 neurological syndrome: Implications for sequelae's treatment (Camargo-Martínez et al., 2021)	39
Source 3. COVID-19: Evaluation and management of adults following acute viral illness. UptoDate (Mikkelsen & Abramoff, 2021)	40
Source 4. Assessment and management of post-COVID fatigue. (Gaber, 2021)	42

Resources for Healthcare Professionals and Patients	43
Source 1. For Healthcare Professionals	43
Source 2. Post-COVID Conditions: Information for Healthcare Providers (CDC 2021)	44
Source 3. For Patients	52
Evidence Tables	53
Table 1: Summary of Evidence on Risk Factors for Post-Acute COVID-19	53
Table 2: Scan of Canadian programs/services for those experiencing post-acute COVID-19	59
Table 3: US jurisdictional scan of programs/services for those experiencing post-COVID after effects	66
References	93
Appendix A Symptom Sequelae	97
Appendix B Symptom Management	98
Appendix C Primary Care Pathways	103
Appendix D Specialty, Multidisciplinary Care Pathways and COVID Clinics	105

Definitions and Terminology

Source 1. Chronic COVID syndrome: Need for an appropriate medical terminology for long-COVID and COVID long-haulers (Baig, 2020).

- The aim of this perspective article is to argue for consistency in terminology as more research is being published; there is a lack of consensus on the name of the symptoms which occur post COVID infection.
- The article defines long-COVID as when *patients report symptoms following an acute infection with COVID-19*.
- It is currently being termed **long-COVID** and **COVID long-haulers**; the authors suggest **chronic COVID-19 syndrome (CCS)** as a potential name.
 - The article also suggests categorizing cases of CCS based on which organ system is the most impacted.

Source 2. Why the Patient-Made Term 'Long Covid' is needed (Perego, 2020)

- This perspective article explores the syndrome of **Long Covid**, defining it *as symptoms persisting for longer than four weeks*.
- Symptoms and presentation can vary greatly and can occur in patients who were hospitalized and those that were not.
- Fatigue is one of the most commonly reported persistent symptoms.
- The author emphasizes the need for appropriate treatment plans, ruling out serious complications, and ensuring that symptoms are not assumed to be anxiety.
- In conclusion, this article highlights the importance of ensuring that individuals are made aware of the potential to experience Long Covid symptoms.
- Additionally, the authors stress the importance of collaborating with patients who have experienced Long Covid to establish best practices in treatment.

Source 3. How and why Patients made Long COVID (Callard, 2021).

- This perspective article discusses how the concept of Long COVID is thought to be the first syndrome established through social media channels through patients connecting with one another; article highlights the importance of patient activism and first voice perspectives.
 - Between 5-10% of patients may experience persistent symptoms.
 - 87% of hospitalized patients reported experiencing at least one symptom 60 days after their infection.

Source 4. Long COVID: let patients help define long-lasting COVID symptoms (Nature Editorial, October 7th, 2020).

- This article outlines that there is no agreed upon term for long-lasting COVID symptoms; post-COVID syndrome or chronic COVID-19 are used – reaching agreement on terminology is key.

- Some are advocating for the use of “long COVID”; article suggests that using words such as ‘post’, ‘syndrome’, and ‘chronic’ may delegitimize suffering.
- A negative test should not define recovery, as many experience symptoms for longer.

Source 5. Defining Post-COVID Symptoms (Post-Acute COVID, Long COVID, Persistent Post-COVID): An Integrative Classification (Fernández-de-Las-Peñas, 2021)

- This article provides an integrative classification that aims to define the lingering symptoms of COVID-19:
 - *Acute post-COVID symptoms*: symptoms lasting between 5-12 weeks after infection
 - *Long post-COVID symptoms*: symptoms lasting from 12-24 weeks after infection
 - *Post-COVID symptoms*: symptoms lasting more than 24 weeks

Source 6. Understanding Long COVID-19 (Evidence Synthesis Network, 2021)

- **Aim:** This is an evidence brief produced for the Ontario Ministry of Health which summarizes the evidence on Long COVID
- **Approach:**
 - English articles were identified through a search of PubMed and google scholar
 - Search completed on April 7, 2021
- **Findings:**
 - n=10 narrative and systematic reviews were included which represent over 300 individual studies
 - Definition of Long COVID: any symptoms that develop or persist between 4—12 weeks after initial infection. Formal definitions proposed include
 - Ongoing symptomatic COVID-19 (Signs and symptoms 4-12 weeks)
 - Post COVID-19 syndrome: symptoms developed during or post infection and persisting more than 12 weeks
 - Long COVID: signs and symptoms that continue or develop after COVID-19. This encompasses both ongoing symptomatic COVID-19 and post COVID-19 syndrome
 - Post acute; late-onset; and chronic
 - Acute post-COVID-19 (weeks 5-12); Long post COVID-19 symptoms (week 12 to 24); persistent post-COVID-19 (more than 24 weeks)
 - The most common symptoms of long COVID were fatigue, shortness of breath and chest, joint, or muscle pain and headache. Psychological and cognitive symptoms are also commonly reported.
 - Risk factors included: 1) a higher acuity of initial infection, 2) more symptoms with initial infection, 3) obesity, 4) older age, 5) female sex, 6) being a health care worker, and 7) comorbidities.

- Authors identified the need for further research regarding the prognosis of individuals with Long COVID.

Symptoms and Risk Factors

([Appendices A and B](#))

Source 1. Persistent Symptoms and Post-Acute COVID-19 in Adults – What We Know So Far (Public Health Ontario, April 9th, 2021).

****rapid evidence synthesis****

- **Aim:** To provide a rapid review of the information available to date on persistent post-acute COVID-19 symptoms in adults; defines persistent symptoms as those developing or **lasting >21 days past symptom onset**.
- **Approach:** This is a rapid evidence synthesis. Searches were conducted in MEDLINE, National Institutes of Health COVID-19 Portfolio (Preprints), Embase, and Global Health/Scopus (March 2021) and PubMed and Google Scholar (April 2021).
- **Findings:** Derived from 4 systematic reviews and meta-analyses and 22 primary research articles (includes 7 preprints). Studies came from multiple countries: Italy, China, France, England, United States, Germany, Spain, Sweden, Switzerland, and Russia (n=8 studies included patients from various countries).
 - Prevalence of symptoms: Patients with at least one persistent symptom ranged from 31–51%; and prevalence of symptoms decreased over time (e.g., [data from the UK Office of National Statistics](#) found that 21% of patients experience at least one persistent symptom 45 days after symptom onset, and 13.7% at 84 days as of March 8, 2021).
 - There were three common groupings of symptoms: **neuropsychiatric, respiratory, cardiovascular and cerebrovascular**
 - Common neuropsychiatric symptoms (2 reviews/meta-analyses and 14 primary research studies): fatigue (30-78%), headache (18-50%), cognitive symptoms such as attention disorder, memory loss, and anxiety (11-55%), sleep disorders (11-65%) and smell/taste dysfunction (10-43%).
 - Common respiratory symptoms (3 reviews/meta-analyses and 10 primary research studies): cough (20-27%) and shortness of breath (16-55%).
 - Post-mortem studies also showed diffuse alveolar damage, which indicates the possibility of longer-term illness such as interstitial pulmonary fibrosis and pulmonary hypertension.
 - Common cardiovascular and cerebrovascular symptoms (2 reviews/meta-analyses and 4 primary research studies): chest pain (12-24%), tachycardia (11-34%) and palpitations (10-40%).
 - The expression of angiotensin-converting enzyme 2 (ACE2) receptors on myocytes, coronary endothelial cells, and arterial smooth muscle was shown to increase the risk of organ damage in individuals with COVID-19.

- Other symptoms: joint and/or muscle pain (19-44%), fever/chills/sweats (12-24%), and gastrointestinal symptoms, such as diarrhea, vomiting, nausea, and loss of appetite (12-21%).
- **Risk factors for persistent infection:** Comorbidities (e.g., obesity, asthma) and increased severity of COVID-19 infection were found to be primary risk factors in 6 of 11 studies reviewed. Being female was also found to increase risk in 3 of 11 studies.

Source 2. COVID-19 Scientific Advisory Group Rapid Evidence Report (Alberta Health Services COVID-19 Scientific Advisory Group, November 23rd, 2020).

****rapid evidence synthesis****

- **Aim:** To identify: 1) the most common persistent symptoms and their duration; 2) patients at high risk of chronic symptoms; and 3) what mechanisms are likely for chronic symptoms. Symptoms are considered chronic when they last >30 days.
- **Approach:** Rapid evidence synthesis. Databases searched (up to early November 2020) were: COVID MEDLINE, CINAHL, LitCovid, PubMed, TRIP PRO, WHO COVID-19 Database, Centre for Evidence Based Medicine (CEBM), Google and Google Scholar.
- **Findings:** 54 articles were included (n=14 preprints).
 - There is variation among articles pertaining to the reported frequency and duration of persistent COVID-19 symptoms.
 - Most common symptoms 4-6 weeks post diagnosis: fatigue (55%), headache (37.8%), dyspnea (33%), loss of taste (28%), and cough (18.3%).
 - Most common symptoms 8-12 weeks post diagnosis: fatigue (42%), dyspnea (39%), sleep impairment (30.8%), cognitive impairment (20%), and headache (18.2%).
 - **There is little consensus on risk factors for the development of chronic symptoms (n=17 studies); risk factors include:**
 - *Having dyspnea during the acute phase of the illness* (day 7 after onset of symptoms) or having a history of asthma or chronic lung disease increased risk of chronic dyspnea (OR 2.4 [1.0- 5.3 95%CI, p=0.02).
 - *Being younger (about 40-60 years)* (OR 1.033 [95%CI 1.003-1.067], p=0.037), *female* (OR 1.76 [95% CI 0.94-3.37], p=0.085), or having a previous diagnosis of a psychiatric disorder (RR 1.65 [95% CI 1.59-1.71], p<0.001) all showed a higher risk for development of persistent psychiatric symptoms, particularly PTSD.
 - *More severe COVID-19 illness* was associated with higher risk of chronic symptoms (OR 2.4 [1.0- 5.3 95%CI, p=0.02).
 - There is no difference between chronic symptoms in ICU and non-ICU hospitalized patients.
 - Hospitalization was shown to protect against chronic symptoms (particularly psychiatric symptoms) (OR 1.081[95% CI 0.57- 2.02], p=0.81).

- Note: There is little data on persistent symptoms in pediatric populations; one study from Italy (n=25 participants) suggested that pediatric patients do not have chronic symptoms.
- **Recommendations:**
 - Strategies to support COVID-19 patients with chronic symptoms should be multidisciplinary with options for decentralized care.
 - COVID-19 patients who are identified as being at higher risk (especially those with risk of chronic mental health and respiratory symptoms) should have more attention made to their general health in long-term recovery.
 - A systematic approach should be developed to monitor and study chronic symptoms with COVID-19 to better understand the local context.

Image Source: Alberta Health Services rapid evidence synthesis

Table 1a. Most Common Symptoms and Range of Prevalence Noted by Included Studies.

System	Symptom	# of STUDIES	Median [Range] Prevalence Range (4-6 week f/u studies)	Median [Range] Prevalence Range (8, 12 or more week f/u studies)
Respiratory	Shortness of breath (dyspnea)	18	33% [1.53% - 56%] (5 studies; 2 unclear)	39% [1.53% - 48%] (9 studies; 4 unclear)
	Cough	13	18.3% [7%-33%] (5 studies, 3 unclear)	7.7% [1.81% - 27%] (4 studies, 2 unclear)
	Chest pain	7	18.0% [n/a] (1 study, 3 unclear)	17.1% [13%-31%] (4 studies, 2 unclear)
Neurological	Fatigue	15	55% [16.4%-73%] (6 studies, 2 unclear)	42% [9.5%- 62%] (7 studies, 1 unclear)
	Headache	12	37.8% [15%-50%] (3 studies, 4 unclear)	18.2% [7%-22%] (3 studies, 2 unclear)
	Loss of smell (anosmia)	11	12% [5%-36%] (5 studies, 2 unclear)	12% [9.7%-39%] (5 studies, 1 unclear)
	Cognitive impairment	9	18% [12%-25.4%] (3 studies, 4 unclear)	20% [12%-28%] (2 studies, 2 unclear)
	Loss of taste (ageusia)	8	28% [9%-32%] (3 studies, 4 unclear)	12.1% [1.17%-23%] (2 studies, 1 unclear)
Musculoskeletal	Muscle/joint pain	8	9.8% [5%-15%] (3 studies, 3 unclear)	16.3% [6%-28%] (3 studies)
Mental health	Sleep impairments	7	40% [n/a] (1 study, 3 unclear)	30.8% [10%-39%] (3 studies)

Source 3. The occurrence of long COVID: a rapid review. Pan African Medical Journal (Iwu et al 2021)

****rapid evidence synthesis****

- **Aim:** This article is a rapid evidence synthesis focused on summarizing the evidence on the long term effects of COVID-19 infection. The primary outcome of interest was the reporting of new or persistent symptoms.
- **Approach:** A targeted search was conducted from inception to November 23 2020. Databases searched were: Cochrane Library, PubMed, and Scopus. The WHO COVID-19 database and Google Scholar were also searched. Eligibility for inclusion were: 1) study design [randomized trials (with randomization at either individual or cluster levels), case-control studies, case reports, case series prospective cohorts, controlled before-after studies, interrupted time series studies, and repeated cross-sectional studies], 2) no language restriction,

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

3) no restriction on publication status, 4) population: both adults and children. A quality appraisal was not conducted. Reference chaining was conducted.

- **Findings:** 11 studies met criteria for inclusion; all studies were conducted in high income countries (e.g., US, United Kingdom, Europe – Sweden, Italy, France, Austria). Most studies (n=6) were conducted using surveys; n=2 were case reports.
 - *Common persistent symptoms:* fatigue (n=6 studies), difficulty in breathing (n=5 studies), cough (n=3 studies), chest pain (n=2 studies), sleep disorders (n=4 studies), loss of memory (n=2 studies), muscle pain and weakness (n=2 studies)
 - Additional reported symptoms were: heart palpitations, headaches, difficulties concentrating, muscle weakness, dizziness, sore throats, loss of sense of smell (anosmia), loss of sense of taste (ageusia), skin rashes, hair loss, diarrhoea and vomiting. Two studies also reported on lung damage and heart dysfunction (both studies were from Austria).
 - Psychiatric disorders were also reported; most frequently anxiety disorders.
- **Conclusions:**
 - COVID-19 can have long term effects for both physical and mental health; further research is required
 - Structured follow-up with COVID-19 patients is suggested along with the need to develop clinical guidelines

Source 4. Post-acute COVID-19 syndrome. Nature Medicine (Nalbandian et al 2021)

- **Aim:** To provide a comprehensive review of the current literature on post-acute COVID-19, its pathophysiology and its organ-specific sequelae. The article provides a descriptive account of various epidemiological causes, risk factors, pathophysiology, and sequelae for the following areas: pulmonary, hematologic, renal, endocrine, and dermatological.
- **Approach:** This is a non-systematic review of the literature.
- **Key findings:**
 - **Definition of post-acute COVID-19:** persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection > 4 weeks from the onset of symptoms
 - May be further divided into two categories: 1) *Subacute or ongoing symptomatic COVID-19*: includes symptoms and abnormalities presenting from 4–12 weeks beyond acute COVID-19; 2) *Chronic or post-COVID-19 syndrome*: includes symptoms and abnormalities persisting or presenting > 12 weeks from the onset of acute COVID-19 and not attributable to alternative diagnoses.
 - **Risk factors for post-acute COVID-19 syndrome:**
 - The severity of acute COVID-19 (measured, for example, by admission to an ICU)
 - Pre-existing respiratory disease

- Higher BMI
- older age
- Black, Asian and minority ethnic (BAME)
- dyspnea at 4–8 weeks follow-up
- comorbidities, such as diabetes, obesity, chronic cardiovascular or kidney disease, cancer and organ transplantation

Source 5. Long-term Health Consequences of COVID-19. JAMA. (del Rio et al, October 5, 2020)

****highly accessed article****

- **Aim:** This is a highly accessed viewpoint article on post-acute COVID-19. The article briefly summarizes published evidence to-date and details what is known regarding the epidemiology, physical manifestations of post-acute COVID-19, and impacts to emotional health and wellbeing.
- **Key points:**
 - **Epidemiology:** Currently there is no consensus on defining post-acute COVID-19. The authors suggest that this describes symptoms that persist >3 weeks after initial onset; chronic COVID is >12 weeks (based on a large survey in the US, UK and Sweden with 4M+ participants).
 - Post-acute COVID-19 is observed regardless of severity of illness
 - **Physical manifestations:** Fatigue and dyspnea are commonly reported; persistent cardiovascular, pulmonary and neurologic symptoms are also observed
 - **Emotional health and wellbeing:** impacts to emotional health and wellbeing are yet to be determined.
- **Conclusion:** many COVID-19 patients have been affected by persistent symptoms. It is important to take a multidisciplinary approach to care.

Source 6. Patient Symptoms and Experience Following COVID-19: Results from a UK Wide Survey

- **Aim:** This study aimed to investigate the experiences of patients who had persistent COVID-19 symptoms, following their initial investigation.
- **Approach:** Descriptive and thematic analyses of a survey (n=3290 respondents) hosted by [Asthma UK and the British Lung Foundation](#) on their post-COVID hub. The survey asked individuals about their experiences after having COVID-19.
- **Findings:**

- Commonly reported symptoms included: *breathing problems, fatigue, and muscle weakness* (see proceeding table)
- **Symptoms were not related to the severity of initial infection.**
- Many individuals who managed their illness at home (rather than hospital) noted experiencing barriers accessing health care and experiencing stress.
- **Conclusion:** Post-COVID can result in varying symptoms. This study points towards the need for structured follow up and support/treatment plans.

Table 2: symptoms reported in those who report a) <4 weeks since symptom onset; b) 4-8 weeks since symptoms onset c) 8-12 weeks since symptoms onset; d) > 12 weeks since symptoms onset.

	<4 weeks n=270	4-8 weeks n=494	8-12 weeks n=641	>12 weeks n=1865	P value
Gender					
Female	214 (79.3)	387 (78.3)	506 (78.9)	1440	0.714
Symptoms					
Breathing problems	246 (91.1)	460 (93.1)	596 (93.0)	1707 (91.5)	0.470
Changes in mood, or anxiety or depression	93 (34.4)	206 (41.7)	266 (41.5)	842 (45.1)	0.006
Cough	135 (50.0)	221 (44.7)	275 (42.9)	752 (40.3)	0.013
Extreme tiredness/fatigue/lack of energy	216 (80.0)	406 (82.2)	535 (83.5)	1568 (84.1)	0.338
Hair loss	10 (3.7)	24 (4.9)	61 (9.5)	248 (13.3)	<0.001
Loss of appetite or weight loss	70 (25.9)	126 (25.5)	126 (19.7)	430 (23.1)	0.069
Loss of taste or smell (anosmia)	120 (44.4)	152 (30.8)	172 (26.8)	488 (26.2)	<0.001
Muscle weakness or joint stiffness	118 (43.7)	235 (47.6)	315 (49.1)	984 (52.8)	0.012
Nightmares or flashbacks	25 (9.3)	60 (12.1)	69 (10.8)	273 (14.6)	0.012
Problems with mental abilities including anxiety/depression	79 (29.3)	192 (38.9)	279 (43.5)	950 (50.9)	<0.001
Sleep problems	112 (41.5)	233 (47.2)	296 (46.2)	887 (47.6)	0.196
Symptoms of PTSD	35 (13.0)	74 (15.0)	111 (17.3)	352 (18.9)	0.037

Source 7. Post-COVID-19 Symptom Burden: What is Long-COVID and How Should We Manage It? Lung (Skyles et al, 2021)

- **Aim:** To report on lasting symptoms of COVID-19 patients hospitalized in England during the first wave of the pandemic.
- **Approach:** All patients discharged from Hull University Teaching Hospitals NHS Trust with COVID-19 pneumonia were offered follow-up. Not included: 1) those followed up with the local frailty team; 2) those with mild COVID-19 symptoms and normal chest X-ray
 - N=134 patients were included in the study. All experienced radiological evidence of COVID-19 pneumonia and 87% of participants required oxygen or other respiratory support; 20% were admitted to the ICU.
- **Findings:**
 - At follow up: 60% reported breathlessness, 51.5% reported myalgia, 47.8% reported anxiety, 39.6% reported extreme fatigue, 37.3% reported low mood, and 35.1% reported sleep disturbance. Females were more likely to report anxiety ($p=0.001$), low mood ($p=0.031$), myalgia ($p=0.022$), fatigue ($p=0.004$), sleep disturbance ($p=0.009$), and memory impairment ($p=0.001$).
 - High BMI was associated with myalgia ($p=0.012$) and fatigue ($p=0.046$).
 - There were no significant differences between patients who received different levels of care, oxygen, or respiratory support.
 - There was a decrease in the proportion of patients reporting persistent symptoms over time; the trend was not significant.
 - 86% of patients reported at least 1 persistent symptom.
 - Symptom clusters were identified through a co-occurrence matrix:
 - Cluster A: Myalgia and fatigue **females significantly more likely to report symptoms within this cluster ($p < 0.001$)
 - Cluster B: Low mood, anxiety, sleep disturbance (nd between patients)
 - Cluster C: memory impairment, attention deficit, cognitive impairment (nd between patients)
- **Conclusions:**
 - Authors suggest that Long COVID may not be a new phenomenon, but rather that neuropsychiatric trauma may play a greater role in this syndrome to manifest as that similar to a post-traumatic distress
 - Study findings suggest a greater focus on resource allocation for rehabilitation and psychological supports for Long-COVID, rather than specialist respiratory services and/or advanced diagnostics

Source 8: Attributes and predictors of Long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study App (Sudre et. al., 2020)

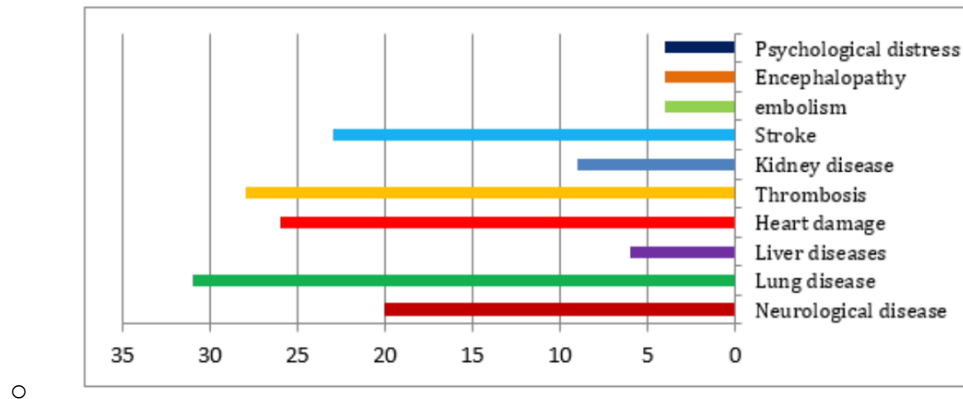
- **Aim:** This study aimed to investigate symptoms of COVID-19 in users of the COVID Symptoms Study App.
- **Methods:**

- The study was a prospective observational cohort study, 4182 users of the app were included. This was a UK study with participants residing in Great Britain, USA and Sweden.
- The app allows participants to report their symptoms and provides a long text option for additional information.
- They compared individuals who had *short* COVID: symptoms lasting for 10 days or less, and individuals with *long* COVID: symptoms persisting for more than 28 days.
- **Findings of the current study:**
 - **Most common symptoms** of Long COVID: **fatigue and head aches**
 - Their findings indicated a correlation between increasing age and Long COVID, however **females in the 50-60 age range had the highest chance of suffering** from Long COVID.
 - **Experiencing more than 5 symptoms in the first week was a strong predictor of Long COVID**, specifically fatigue, headache, dyspnea, hoarse voice, and myalgia.
 - There was a **correlation between hospitalization in acute phase and Long COVID**.
 - **Asthma was the only co-morbidity that was significantly associated with Long COVID**.
 - **Two main patterns** with long COVID were found:
 - **those reporting fatigue, headache and upper respiratory issues**
 - **those with multi-system issues**
- Conclusion: characteristics of acute infection can help predict Long COVID prevalence. Symptom reporting apps such as these can be helpful in helping to identify and predict Long COVID.

Source 9. Late Complications of COVID-19: a Systematic Review of Current Evidence. (Seyed-Alinaghi et. al., 2021)

- **Aim:** This systematic review compiled current evidence on the late complications of COVID-19.
- **Approach:** An online search of PubMed, Scopus, Science Direct, Up to Date and Web of Science was conducted. Databases were search up to November 4 2020.
- Results:
- 65 articles included in finale review. Results indicated that lung injuries, venous/arterial thrombosis, heart injuries, cardiac/brain stroke and neurological injuries were the most common severe late complications of COVID-19. Additionally, encephalopathy, and psychological distress were also identified as late complications. The following graphic illustrates the frequency of complications:

Figure 1. Frequency of identified late complications.



Source 10. COVID-19 symptoms over time: comparing long-haulers to ME/CFS (Jason et al 2021)

Aim: This article aims to examine the symptoms of Long COVID, see how they change over time, and compare them with the symptoms of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS)

Approach: Long COVID-19 patients (n=278) and ME/CFS patients (n=502) completed the *DePaul Symptom Questionnaire* (a validated self-assessment for ME/CFS which includes items pertaining to symptomatology, demographics, medical/occupational/social history). The questionnaire was modified for Long COVID-19 group to include additional items from the CDC list of symptoms for COVID-19.

- Long COVID-19 group: self-assessment of symptoms in the first two weeks of infection and at their current state
- ME/CFS group: symptoms in the past six months of their condition (ME/CFS group).
- Survey results were compared between groups.

Key findings:

- Duration of illness for Long COVID-19 group was 21.7 weeks
- The Long COVID patients reported a reduction in overall symptoms over time in the following domains: sleep, post-exertional malaise, immune, neuroendocrine, pain, GI, orthostatic
- Neurocognitive symptoms were reported to increase over time within the Long COVID-19 group, notably significant increases over time were reported in the following symptoms: 1) trouble forming words, 2) difficulty in focus, and 3) absentmindedness
- Sensitivity to alcohol and hair loss also worsened over time in the Long COVID-19 group
- There were differences in severity of symptoms between both groups

Long COVID-19 in special populations

Source 1. Long-term symptoms after SARS-CoV-2 infection in school children: population-based cohort with 6-months follow-up.

medRxiv. (Radtke et al 2021) ****pediatric population****

- **Aim:** This study investigated the prevalence of Long COVID as well as the prevalence of specific symptoms experienced in a sample of school children aged 6-16 in Switzerland.
- **Approach:** This was part of a longitudinal cohort study conducted between June 2020 and April 2021 in a representative sample of approximately 2500 children in randomly selected schools in Zurich. Serological testing was used to identify the presence of SARS-CoV-2 antibodies in October/November 2020
- **Findings:**
 - There were 1350 children included (included those with a serological test)
 - Prevalence of COVID-19 was 8.0% (n=109 children)
 - Of these 109 children : **7% had symptoms persisting > 4 weeks and 2% had symptoms persisting more than 12 weeks**
 - Symptoms included: tiredness (5%), headache (4%), runny nose (2%), stomachache (2%), sleep disturbances (2%), cough (1%)

- The authors suggest that while children can be impacted by Long COVID, the degree to which this can occur is unclear.

Guidelines on Long COVID-19

Source 1. COVID-19 rapid guideline: managing the long-term effects of COVID-19

- **Aim:** To describe guidelines developed by NICE, the Scottish Intercollegiate Guidelines Network (SIGN) and the Royal College of General Practitioners (RCGP) on the considerations and management of post-acute COVID-19
- **Approach:** Guidelines were developed using a predefined interim process to develop guidelines in health and social emergencies. They rely on expert opinion and consensus. They are living guidelines and were last updated December, 2020
- **Key findings**
- Long COVID or post-COVID-19 syndrome is defined as persistent and symptoms of COVID-19. Long COVID is inclusive of the following two groups:
 - *Ongoing symptomatic COVID:* symptoms lasting 4-12 weeks
 - *Post COVID-19 syndrome:* symptoms lasting >12 weeks
- The guidelines include recommendations on:
 - Steps to identify persons with long COVID
 - Provide information about long COVID when COVID diagnosed
 - Continued monitoring of persons with COVID-19 in post-acute phase
 - Assessment of people with new/ongoing COVID-19
 - Assessments should include clinical history- history should consider COVID infection and other health history; impacts of previous and current symptoms on ADL; timing of symptom onset
 - Investigations and referral
 - Provide referral to relevant services, including psychiatric services
 - Offer appropriate diagnostic and screening tests (e.g. chest x-rays)
 - Planning care
 - Advise on self-management
 - Put patient on appropriate care pathway, including referral to specialist care or multidisciplinary assessment
 - Management
 - Includes multi-disciplinary rehab

- Consider additional supports for children and older people
- Follow-up and monitoring
 - Encourage self-monitoring at home
 - Shared decision making on frequency of monitoring
- Sharing information and continuity of care
 - Share information with all relevant care providers
- Recommend clinical investigation, including blood and organ tests, if a patient is having persistent or new symptoms following 4 weeks.
- Currently, the authors mention the importance of individualized rehabilitation programs and how more research on this topic is needed.
 - The guidelines will evolve and adapt as more research on long COVID is completed.

Source 2. Post-COVID Conditions: Information for Healthcare Providers (CDC 2021)

- **Aim:** These are guidelines for health care providers last updated April 8, 2021
- Defined as experiencing “new, reoccurring, ongoing symptoms, and clinical findings” > 4 weeks after an infection or after recovery; symptoms are potentially caused by reinfection, pre-existing conditions, or other diagnoses
- Key points about symptoms:
 - Multi-organ effects: cardiovascular, pulmonary, psychiatric, renal, neurologic, dermatologic
 - Autoimmune conditions, multisystem inflammatory syndrome (MIS), and persisting health effects
 - Unknown if these effects may lead to chronic illness
 - Post-COVID conditions may include effects from treatment and hospitalization, such as post-intensive care syndrome, weakness, PTSD
 - **Symptoms also occur in people with mild and asymptomatic COVID**
 - Mood changes can occur (e.g., depression and anxiety)
 - Difficulty breathing (with and without abnormal imaging and function testing), difficulty thinking and concentrating, fatigue
 - Pain in chest, muscles and joints
 - Coughing
 - Dizziness and headache
- In patient-led surveys, PEM (post-exertional malaise) has been reported

- Older patients and patients with underlying health conditions may have higher risk of severe symptoms; younger patients have also reported symptoms lasting for months after acute illness

Post-acute COVID clinics across the United States provide aftercare treatment and survivor support groups are affected by COVID-19 (see [Table 2: Scan of Canadian programs/services for those experiencing post-acute COVID-19](#))

Jurisdiction	Location of program/service	Program approach	Other
British Columbia	BC Provincial Health Services Authority: The Post COVID-19 Interdisciplinary Care Network	Background: The Post COVID-19 Interdisciplinary Care Network coordinates care, research, and education for recovery of patients with ongoing COVID-19 care needs. Demographics: not described Eligibility for participation: • Available to patients across BC who meet clinical eligibility criteria (not listed) • Must have had a positive COVID-19 test (unless patient was sick during early stages of pandemic from January to May 2020) • Patients must be referred by their primary care provider using the clinic referral form. Approach: • Across the province, there are 3 post COVID-19 recovery clinics. • Located at St. Paul's Hospital, Vancouver General Hospital • Virtual care options may be available in some cases.	Education tools and resources are available to those who do not meet clinical eligibility criteria.

		· Network is provided in partnership between regional health authorities, research organizations, and patients.	
--	--	---	--

Alberta	Alberta Health Services Post-COVID Pulmonary Clinics	Background: Since December 2020, 3 post-COVID pulmonary clinics have been established for Albertans in the following locations: · Peter Lougheed Centre (Calgary) · Rockyview General Hospital (Calgary) · Kaye Edmonton Clinic Demographics: not described. Eligibility for participation: · Patient must be referred by family/primary care physician · Patient must have documented positive COVID swab · Patient must have persistent pulmonary/chest symptoms for at least 12 weeks post original diagnosis date Approach: · Once referred and triaged to the patient's preferred location, the patient will be seen by a physician and connected with a physiotherapist affiliated with the clinic as required. · This clinic has a focus on chronic pulmonary symptoms post COVID-19 infection. If there are non-pulmonary medical concerns, physicians should refer patients to the appropriate specialist services.	
----------------	--	---	--

	Edmonton North Primary Care Networks (PCN): COVID-19 Recovery Clinic	Background: The Edmonton North PCN created the COVID-19 Recovery Clinic to provide specialized care and follow up to people who were diagnosed with COVID-19 and are now in recovery but still experiencing symptoms. Demographics: not described Eligibility for participation: - Referrals accepted from ALL Edmonton Zone physicians - Program designed for adult patients who are >10 weeks post COVID-19 positive still experiencing ongoing symptoms. - Referral form includes the date that patient tested positive, the symptoms they are experiencing, and any treatments tried to date. Approach: - Care is provided through a novel mix of on-site and virtual clinics that allow for multidisciplinary engagement with patients, allied health professionals, primary care physicians and a network of subspecialists. - The clinic is integrated into the local research community, enabling fast-tracking of provincial research programs and knowledge translation to clinic professionals. - In-person appointments will take place at the main Edmonton North PCN main location (Northgate Centre) or at a specialist's office.	Specialist referral process provided by ConnectMD , a service that connects family doctors in the Edmonton and North zones with over 35 specialty groups for advice.
--	--	---	--

		The clinic's multidisciplinary team includes: · Cardiology · Exercise therapy · Mental health support · Neurology · Nursing · Physiotherapy · Pulmonary · Rheumatology · Social work support	
--	--	---	--

	Alberta Health Services: Getting Healthy after COVID-19	Background: A collection of self-management and educational tools for patients experiencing long COVID-19. Demographics: not applicable. Eligibility for participation: available for free online, treatment resources linked available to Albertans. Approach: • Educational and management resources for recovery, ranging from breathing tips, advice on managing brain fog, mental health, and COVID-19 and pregnancy. • Links users to resources for long COVID-19 available in their region, including AHS pulmonary/respiratory care clinics.	
Quebec	Montreal Clinical Research Institute (Montreal) – Post-COVID Clinic See related CBC media article.	Program background: Clinic provides support for eligible patients for 1 year, 3-4 visits Demographics: not described Eligibility for participation: • Infected with COVID-19 for a minimum of 28 days; OR • Essential health worker at risk of being exposed to COVID-19; OR • Have been exposed to COVID-19. Approach (detailed assessment that includes): • blood tests • measurement of lung function • medical examination	This clinic is a part of a research program led by infectious diseases specialist, Dr. Emilia Liana Falcone. Offered free-of-charge.

		• NPS • Continuous glucose monitoring • Appointment for ECG (completed at the CHUM) • Pedometer, etc	
	Sherbrooke (La Clinique ambulatoire post-COVID – L'Hôtel-Dieu Sherbrooke) See related media articles: CBC and Le Journal de Montreal. **all information on the clinic is obtained from media sources.	Background: • Opened in May 2020 (first in the province) Demographics: • As of January 2021, clinic has served approximately 250 persons; • 2/3 of patients are women with a median age of 50 years; • 1/3 patients report experiencing persistent symptoms (manifestations and severity of symptoms vary) Eligibility: • Patients did not require hospitalization during acute COVID-19 (there is no indication if this clinic serves those hospitalized) Approach: • Care is supported by the clinic with referral to specialists if necessary Plans for expansion to an interprofessional team (PT & OT)	Led by Dr Alain Piche (infectious diseases specialist) Patients are also invited to participate in the Biobanque québécoise de la COVID-19

	Chicoutimi	Unable to find any details on Chicoutimi clinic – other than media articles that suggest this clinic is in operation (see media articles linked to other Quebec clinics).	
--	------------	---	--

- Table)

Source 3. Caring for adult patients with post-COVID-19 conditions (Royal Australian College of General Practitioners, n.d.)

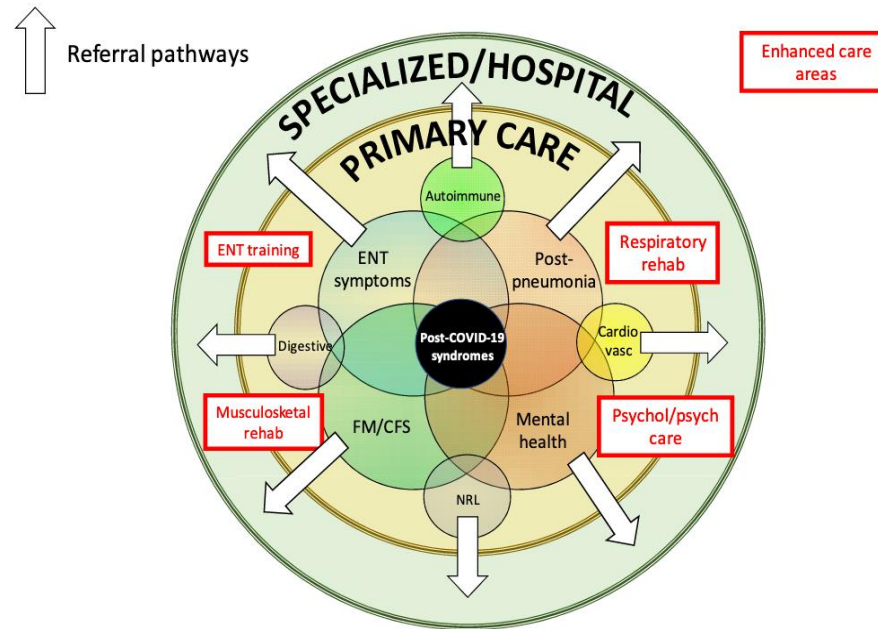
- **Aim:** Guidelines inform general practitioners treating patients with post-COVID-19 conditions. Post-COVID includes illness extending beyond 3 weeks
- Guidelines outline post-acute COVID-19 symptoms and management approaches for common symptoms
- The development of guidelines was not described
- **Findings:**
- **Common symptoms** include pulmonary, cardiovascular, neurological, endocrine, mental health, post-intensive care syndrome, hematological, rheumatological and general symptoms (Found in Appendix A)
- Most common symptoms are fatigue, dyspnea, joint pain, chest pain, cough, changes in smell and taste
- **Management of symptoms**
 - Recommendations are provided to help manage cough, fatigue, chest pain, headaches, neurocognitive difficulties, depression/anxiety, and thrombosis (Appendix B)
- **Providing care for special groups**
- *Persons who were hospitalized*
 - Early telehealth appointment after discharge.
 - Discuss concerns, understand symptoms, assess rehabilitation needs, ensure plans are put in place for follow-ups and if symptoms worsen, plan for face-to-face assessment.
 - Recommendations for high-risk patients or those who experienced VTE:
 - 2-4 weeks anticoagulant therapy for high risk of VTE.
 - three months of anticoagulant therapy for those who experienced VTE.
 - Patients are encouraged to do low-moderate physical exercise and daily activities for 6-8 weeks after discharge.
 - An assessment should be done 6-8 weeks after discharge to assess physical and emotional functioning.
- *For older patients, consider:*
 - Proactive surveillance.
 - Early investigation of symptoms.

- Check oxygen saturation and screen blood for lymphopenia, rise in inflammatory markers, hyponatraemia, and acute kidney injuries.
- Delivery of medication and assistance with food and meals to maintain independence.
- *For patients with cognitive disabilities:*
 - Note that symptoms may be difficult to pick up by people unfamiliar with the patient (look for secondary signs of symptoms).

Source 4. Long Covid-19: Proposed Primary Care Clinical Guidelines for Diagnosis and Disease Management. International Journal of Environmental Research and Public Health. (Sisó-Almirall et al 2021)

- **Aim:** The main objective was to develop primary care clinical guidelines for patients with long COVID-19 signs and symptoms to enable primary care professionals to address the health consequences
- **Approach:** Guidelines were developed by reviewing studies published so far on long COVID-19, editorials and expert opinions, press releases, and the use of authors' clinical experience. Development was led by the Catalan Society of Family and Community Medicine long COVID-19 study group
- **Key points:**
 - Patients with long COVID-19 should be managed using structured primary care visits based on the time from diagnosis of SARS-CoV-2 infection
 - Based on the current limited evidence, **disease management of long COVID-19 signs and symptoms will require a holistic, longitudinal follow up in primary care, multidisciplinary rehabilitation services, and the empowerment of affected patient groups**
 - **Authors endorse the key points for managing long COVID-19 proposed by the NICE guidelines, including giving advice and information on self-management of symptoms, self-monitoring at home (heart rate, blood pressure, pulse oximetry, sleep surveillance), a central role for multidisciplinary rehabilitation support** (covering physical, psychological and psychiatric aspects) with occupational therapy, physiotherapy, clinical psychology and psychiatric therapy and rehabilitation medicine (Figure 1)

Figure 2. A graphic proposal for the multidisciplinary care of patients with long COVID-19 in primary care. Rehab: rehabilitation, ENT: Ear, Nose and Throat, FM: fibromyalgia, CFS: chronic fatigue syndrome, NRL: neurological, Cardiovasc: cardiovascular, Psychol/psych: psychological/psychiatric.



Care considerations for Long COVID-19

1. Types of Care Management Supports (Greenhalgh et al. 2020; Crocker et al. 2021)

- Most patients recover spontaneously with support, treatment of symptoms and gradual increase in activity.
- Patients usually experience a range of symptoms or complications – so support needs to be multidisciplinary, **taking a ‘whole patient’ perspective.**
- **4 types of support may be required:**

33

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

- Self-care resources and supports
- Generalist care and rehabilitation, e.g. provided by primary care services or multidisciplinary community services
- Specialist clinical assessment, rehabilitation and treatment may be required, e.g. for respiratory, cardiac or neurological symptoms, or specialist psychological support
- Social and economic supports

2. Primary Care

Source 1. Management of post-acute covid-19 in primary care. BMJ. (Greenhalgh et al, 2020)

****highly cited article****

- **Aim:** This article summarizes the management of post-acute COVID-19 in primary care. It was published in August 2020 and is based on evidence available at that time. It used a pragmatic approach based on published studies in other respiratory infections; early editorials and COVID-19 guidance; early reports; [a living review](#) of rehab needs post COVID-19; own clinical experience
- **Key points:**
 - **Definitions:** *Post-acute COVID-19* is defined as symptoms lasting >3 weeks; *chronic COVID* is defined as symptoms lasting >12 weeks.
 - **Prevalence:** 10% of patients will have symptoms for longer than three weeks. Another study indicated that only 65% of people reported returning to normal health after 2-3 weeks.
 - **Symptoms:** cough, low grade fever, fatigue, shortness of breath, chest pain, headaches, neurocognitive difficulties, muscle pains/weakness, GI upset, thromboembolic conditions, depression, skin rashes
 - The authors note there is limited research on the topic.
 - **Tests to identify:** Blood tests only if clinically indicated
 - – chest x-ray at 12 weeks if experiencing new/progressive symptoms
 - **Supporting recovery:** manage the specific symptoms
 - **Cough:** breathing exercise and medications if indicated
 - **Breathlessness:** breathing exercises; consider use of pulse oximeters
 - **Pulmonary rehab:** multi-disciplinary personalized interventions
 - **Fatigue:** Little available evidence on effective treatment/ management options. Exercise may be beneficial
 - **Chest pain:** usual management for chest pain; a cardiology referral may be needed
 - **Thromboembolism:** anticoagulation and further investigation

- **Ventricular dysfunction:** manage according to standard guidelines. Cardiovascular exercise should be avoided for 3-6 months
- **Neurological sequelae:** supportive management and symptom monitoring
- **Older persons:** may be particularly vulnerable to severe long COVID
- **Mental health:** cross-sector collaborations may be needed. Careful and sensitive management of mental health is important to avoid unnecessary stigmatization
- **Consider social and cultural context** and develop local, system level solutions
- **Recommendations include:**
 - First checking for serious complications and comorbidities.
 - Adopting a holistic approach and treating the patient depending on their symptoms, while keeping mental health and social and cultural considerations in mind.
 - Assessment and symptom management algorithm is presented (see [Appendix C](#))

3. COVID Clinics, Multidisciplinary Care and Specialty Programs

Source 1. Clinical Programs for the Post-Acute Sequelae of COVID-19: What do they Offer? Journal of Medicine and Public Health. (Jacobs & Baniqued, 2021)

- **Aim:** This brief report describes the range of “post-acute sequelae of SARS-Cov-2 (COVID-19) infection” (PASC) **recovery services and early observations regarding signs, symptoms and syndromes**
- **Approach:** Recovery programs were identified via PubMed search, Internet search and review of programs listed on social media sites. Programs summarized were all located in the United States.
- **Findings:**
 - 93 recovery programs located across 31 states were identified. These were categorized as independent or university-based (refer to proceeding table)
 - Few clinics offer multidisciplinary care in one site and as a part of a one assessment
 - PASC symptoms **require a comprehensive assessment with collaboration and care coordination across multiple professional providers**, including primary care, pulmonary medicine, other medical specialists, nursing, social work, psychiatry, physical therapists, behavioral health, and others, either on-site or virtually

- It is essential that an expanded team share their diverse perspectives and interpretation of clinical data to characterize this new syndrome and meet patients' expectations for care
- It is also essential that these recovery programs offer patient support and behavioral health, rarely included in current programs reviewed herein
- Patients suffering from post-acute COVID-19 syndrome require the continuum of chronic care services, and in turn, recovery programs should be designed for this task
- **Many post recovery programs focus on one area of symptomatology rather than offering multidisciplinary comprehensive assessment required for the state of the science and clinical care to advance rapidly and serve the patients most effectively**

Summary of US Recovery Programs (from: Jacobs & Baniqued 2021)

Primary Recovery Center Discipline	COVID-19 Recovery Program Model				
	Independent		University-based		All Programs, n (%)
	Primary specialty, n (%)	Additional Specialty Service(s) offered, n/n (%)	Primary Specialty, n (%)	Additional Specialty Service(s) offered, n/n (%)	
Rehabilitation	21(58)	0	16(28)	1/16(6)	37(40)
Pulmonary	9(25)	8/9(89)	21(37)	9/21(43)	30(32)
Primary care	6(17)	3/6(50)	12(21)	7/12 (58)	18(19)
Cardiology	0	0	2(4)	1/2(50)	2(2)
Behavioral health	0	0	2(4)	0	2(2)
Infectious Disease	0	0	2(4)	2/2(100)	2(2)
Neurology	0	0	1(2)	0	1(1)
Nephrology	0	0	1(2)	0	1(1)
Totals	36(100)	11/36(31)	57(100)	20/57(35)	93(100)

Note: All specialty specialties participating in a Recovery Center Program are identified in the table.

Source 2. A Multidisciplinary NHS COVID-19 Service to Manage Post-COVID-19 Syndrome in the Community. (Parkin et al 2021)

- **Aim:** This article explores a multidisciplinary care pathway for patients experiencing post-covid 19 syndrome. It aims to help inform care in the UK and worldwide. The authors hope this can provide a template for a care pathway for managing post COVID-19 syndrome.
- **Key points:**

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

- **Definition:** Long COVID or post COVID-19 are when symptoms persist for >12 weeks.
- Long COVID can occur with both patients who have and have not been hospitalized; 10% of non-hospitalized patients may experience long COVID.
- The three-tier model of management care pathway depending on the level of symptoms experienced by the patient provided in [Appendix D](#).
- **Interventions:** there is not yet one intervention established for post COVID-19 syndrome, but rather the interventions depend on the patient's experience and the judgement of clinicians.
 - *Level 1 Community COVID-19* multidisciplinary team (MDT) composition can be found in proceeding table.
 - When required, patients are referred to adjunct specialist services, such as speech and swallowing services and mental health and psychology support.

Table 1. Composition of Level 1 COVID-19 MDT (Banding Levels as per NHS Agenda for Change).

Rehabilitation therapists	Medical
Band 8a pathway co-ordinator (1.0 whole time equivalent, WTE)	Consultant in rehabilitation medicine (0.1 WTE)
Band 7 physiotherapist (2.0 WTE)	Consultant in respiratory medicine (0.1 WTE)
Band 7 occupational therapist (2.0 WTE)	Consultant cardiologist (0.1 WTE)
Specialist Allied Health Professionals	Research
Band 6 respiratory nurse (1.0 WTE)	Consultant in rehabilitation medicine (research) (0.1 WTE)
Band 6 respiratory physiotherapist (1.0 WTE)	Band 6 AHP researcher (1.0 WTE)
Band 7 dietitian (0.2 WTE)	Others
Band 6 dietitian (0.5 WTE)	Project manager (0.1 WTE)
Band 7 neuro occupational therapist (0.5 WTE)	Admin support (0.1 WTE)
Band 6 neuro occupational therapist (0.2WTE)	Post doctoral clinical psychologist trainee (0.5WTE)

Source 3. Evidence Synthesis Note: Long COVID Clinics. (Ontario Ministry of Health, 2021)

- **Aim:** Provides a summary of the implementation of Long COVID clinics across various international jurisdictions.

- **Approach:** The authors are members of the COVID-19 Evidence Synthesis Network in Ontario with expertise in knowledge translation and evidence synthesis. Members from Ontario Health (Cancer Care Ontario) and McMaster Health Forum compiled the information for this synthesis note. Full details on the approach to evidence synthesis (e.g., search strategy, inclusion/exclusion criteria) were not provided. Extraction tables were organized by facility (with details on geographical location), governance structure, program delivery, staffing model and funding model.
- **Findings regarding implementation of Long COVID clinics:**
 - Clinics have been introduced in the US, Italy, and the UK; clinics are established for patients who continue to have COVID-19 symptoms months following their diagnosis.
 - Most clinics operate with the help of **multidisciplinary teams** including cardiologists, occupational and physical therapists, psychologists, respiratory specialists, nurses and other disciplines.
 - Clinics use a combination of in person and virtual care.
 - There is a focus on rehabilitation and treating existing symptoms.
 - In Canada, Lifemark has established multiple clinics, focusing on an interdisciplinary approach to rehabilitation (refer to **Table** on programs in Canada)
 - Funding: some clinics are publicly funded, while others are able to be partially covered by health insurance.
 - There is limited published information on the administration of Long COVID clinics.
 - This review did not include information on outcomes (evaluation) pertaining to existing Long COVID clinics.

Source 4. Developing services for long COVID: lessons from a study of wounded healers. (Ladds et al., 2021)

- **Aim:** Provides a summary of the implementation of Long COVID clinics across various international jurisdictions.
- **Approach:** Narrative interviews and focus groups are used in this study to learn from the lived experience of 43 healthcare professionals with long COVID to inform service design. Interviews were conducted between May 2020 and September 2020.
- **Findings:**
 - A set of co-designed quality standards, highlighting equity and ease of access, minimal patient care burden, clinical responsibility, a multidisciplinary and evidence-based approach, and patient involvement;
 - These co-design principles have been used to propose a potential care pathway model that could be adapted and translated to improve care of patients long COVID. (Appendix E)

Management of common sequelae of long COVID-19

* These sources may not be specific to long COVID-19

Source 1. COVID-19 and post-infectious myalgic encephalomyelitis/chronic fatigue syndrome: a narrative review. (Poenaru et al, 2021)

- **Aim:** to review similarities and differences between ME/CFS and post-acute COVID-19 symptoms and discuss management strategies.
- **Approach:** A narrative review of the literature
- Only considerations relevant to post-acute COVID-19 are summarized here.
- **Findings:**
- Some studies report that 75% of COVID-19 patients have at least one persistent symptom 7 to 12 weeks after diagnosis. Fatigue, dyspnea, and anosmia are the most common persistent symptoms.
 - 63% experience fatigue and myalgia 6 months post-discharge.
 - Future studies linking ME/CFS with COVID-19 will be needed.
- Treatment of ME/CFS like symptoms in post-acute COVID:
 - Other organic causes of ME/CFS must be ruled out before diagnosis.
 - Symptoms management and minimizing unnecessary investigations are the general approach to ME/CFS.
 - NIH recommends graded exercise therapy and cognitive behavioral therapy.
 - **Recent studies suggest that graded exercise therapy might worsen post-exertional malaise in some patients.**
 - Recent expert opinions say an approach on conservative symptom relief, referral to specialists, and a multidisciplinary support approach is beneficial, but more research will need to be done on the benefit of any treatment option.
- **Conclusion:** Many persistent COVID-19 symptoms resemble post-infectious ME/CFS, but more studies need to be conducted to establish risk factors, prevalence, natural history, and interventional strategies.

Source 2. Post-COVID 19 neurological syndrome: Implications for sequelae's treatment (Camargo-Martínez et al., 2021)

- **Aim:** Describe key aspects of neurological complications due to COVID-19 with post-COVID syndrome and their treatment
- **Approach:** A narrative review of the literature. PubMed and Science Direct were searched in January 2021. There was no exclusion criteria.
- **Key Points:**

- 18 studies were identified
- **Post-COVID neurological syndrome is a new syndrome of which much is unknown**
- **Persons who develop Stroke:** patients should be treated by a multidisciplinary team, which depending on the patient's abilities, strictly monitoring vital signs when motor exercises are being executed, as well as balance training, gait training (all these with or without external stimuli) and exercises with an intensity according to the recovery period, with a progressive nature and focused on the affected brain region
- **Persons who develop Guillain-Barre:** rehabilitation should be established according to the degree of affection and the affected region.
 - Perform exercises that stimulate motor skills in order to recover muscle tone, training for the recuperation of facial mobility in case of paralysis, or in the case of greater severity, breathing exercises and external stimulation with robotic tools
- **Persons who develop Status epilepticus:** monitoring the metabolic state and controlling electrolytes alteration; improving organ functionality through physiotherapeutic rehabilitation
- **Persons who develop Encephalopathy:** patients can benefit from exercises that stimulate neuroplasticity, such as music therapy, physical therapy, cognitive-behavioral therapy, gait training, tele-rehabilitation
- **Treatments should involve multidisciplinary teams**

Source 3. COVID-19: Evaluation and management of adults following acute viral illness. UptoDate (Mikkelsen & Abramoff, 2021)

- Recovery symptoms and course:
 - Physical and psychological symptoms are common following COVID-19, including:
 - **Persistent physical symptoms** are common, and typically include **fatigue, dyspnea, chest pain, and cough**
 - Less common persistent physical symptoms include anosmia, joint pain, headache, sicca syndrome, rhinitis, dysgeusia, poor appetite, dizziness, myalgias, insomnia, alopecia, sweating, and diarrhea
 - **Patients may also experience psychological or cognitive complaints** including post-traumatic stress disorder, anxiety, depression, and poor memory and concentration
 - While most patients with mild acute COVID-19 disease are expected to recover quickly (e.g., two weeks), a longer recovery should be expected in those with moderate to severe acute disease (e.g., two to three months, sometimes longer in those who survive critical illness)
 - The **wide variability in time to symptom resolution likely also depends upon premorbid risk factors as well as illness severity during acute COVID-19**

- Treatment of cardiopulmonary issues:
 - Approach to management is based upon the management of symptoms following similar illnesses:
 - Dyspnea (see ["Approach to the patient with dyspnea"](#))
 - Cough (see ["Treatment of subacute and chronic cough in adults"](#))
 - Chest discomfort (see ["Clinical evaluation of musculoskeletal chest pain"](#) and ["Outpatient evaluation of the adult with chest pain"](#))
 - Cardiac injury or myocarditis (see ["COVID-19: Cardiac manifestations in adults"](#) and ["Clinical manifestations and diagnosis of myocarditis in adults"](#))
 - Some patients may benefit from cardiac or pulmonary rehabilitation (See ["Cardiac rehabilitation programs"](#) and ["Pulmonary rehabilitation"](#))
- Treatment of neurologic or neurocognitive issues:
 - Patients are managed in a similar way to non-COVID-19 patients with the same issues:
 - See ["COVID-19: Neurologic complications and management of neurologic conditions"](#)
 - See ["Neuromuscular weakness related to critical illness"](#)
 - See ["Guillain-Barré syndrome in adults: Treatment and prognosis"](#)
 - See ["Overview of secondary prevention of ischemic stroke"](#)
 - See ["Hypoxic-ischemic brain injury in adults: Evaluation and prognosis"](#)
 - See ["Treatment of orthostatic and postprandial hypotension", section on 'Nonpharmacologic measures'](#)
 - Typically refer patients with scores indicating moderate to severe cognitive impairment (ie, score <18) for neuropsychological or speech-language evaluation
- Treatment for hypercoagulability:
 - Patients with documented thromboses are treated in a similar fashion to thrombosis in non-COVID-19 patients:
 - See ["COVID-19: Hypercoagulability"](#)
 - See ["Clinical presentation and diagnosis of the nonpregnant adult with suspected deep vein thrombosis of the lower extremity"](#)
 - See ["Primary \(spontaneous\) upper extremity deep vein thrombosis"](#)
 - See ["Catheter-related upper extremity venous thrombosis"](#)
 - See ["Clinical presentation, evaluation, and diagnosis of the nonpregnant adult with suspected acute pulmonary embolism"](#)
 - See ["COVID-19: Acute limb ischemia", section on 'Management'](#)

- Treatment for olfactory/gustatory:
 - Patients with persistent gustatory and/or olfactory dysfunction may benefit from further evaluation and management, including olfactory training by referral to an otolaryngologist or a taste and smell clinic, if available (see ["COVID-19: Neurologic complications and management of neurologic conditions"](#), section on 'Smell and taste disorders' and ["Taste and olfactory disorders in adults: Evaluation and management"](#))
- Treatment for fatigue and functional recovery:
 - For patients with limitations of endurance or exercise tolerance due to muscle weakness or deconditioning, we typically refer for physical therapy or cardiopulmonary rehabilitation
 - For patients with fatigue, we encourage adequate rest, good sleep hygiene, and specific [fatigue management strategies](#)
 - If patients have symptoms consistent with myalgic encephalomyelitis/chronic fatigue syndrome, a similar management strategy is warranted (see ["Fatigue, poor endurance, and functional status"](#) above and ["Treatment of myalgic encephalomyelitis/chronic fatigue syndrome"](#) and ["Approach to the adult patient with fatigue"](#))
- Outpatient rehabilitation:
 - When rehabilitation services are indicated, we typically refer patients within 30 days of recovery from initial infection
 - All patients should be screened for cardiac symptoms prior to beginning any exercise program; if necessary, a full cardiac evaluation may be warranted before commencing rehabilitation therapy
 - While we prefer in-person rehabilitation programs that last six to eight weeks, outpatient and web-based programs are also available, although the latter are less well-validated (see ["Rehabilitation: Setting and prescription"](#))
- Return to work:
 - The ability of patients to return to work or exercise should be assessed on an individual basis, and will likely vary depending upon their baseline pre-COVID-19 functional status and the severity of acute illness, as well as the type and severity of complications experienced by the patient
 - In general, patients planning to return to high-level sport or a physically demanding occupation following myocarditis should be first evaluated by a cardiologist (see ["Return to work or exercise"](#))

Source 4. Assessment and management of post-COVID fatigue. (Gaber, 2021)

- **Aim:** To discuss the diagnosis and management of post-COVID viral fatigue and myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) in relation to COVID.
- Psychological distress during acute and subacute phase of virus and the patient's maladaptive cognitive and behavioural response to COVID-19 and its symptoms are risk factors for chronic fatigue.

- Routine haematology and biochemistry (full blood count, urea and electrolytes, thyroid function tests, liver function tests, bone profile, erythrocyte sedimentation rate and vitamin B12) are recommended tests for evaluation of cases of myalgic encephalomyelitis/chronic fatigue syndrome.
 - Pattern and character of fatigue is also important to assess.
 - Exercise intolerance, post-exertional malaise, cognitive impairment, unrefreshing sleep, and anxiety and depression are common symptoms.
 - Dysautonomia and orthostatic intolerance are associated with severe cases.
- Maladaptive coping strategies should be challenged.
- Interventions with a team validating and empathising with the patient's experience, while educating the patient on the disease is key.
- Improving quality of rest, conserving energy, relaxation training, and pacing techniques are useful. Heart rate monitoring can also be useful for some patients.
- Cognitive behavioural therapy may improve outcomes.
- Intervention goals are to stabilise level of energy and reduce the impact of post-exertional symptoms.
- Recommendations:
 - **Physical pain:** inquire about pain severity. Analgesia could be used, but patients should learn trigger behaviours.
 - **Recurrent headaches:** 80% of patients with myalgic encephalomyelitis/chronic fatigue syndrome have chronic/episodic migraines. Precipitating factors should be minimized. Topiramate has been successful for treatment.
 - **Unrefreshing sleep:** sleep hygiene and management are important. Sedatives and sleeping tablets rarely improve sleep quality.
 - **Anxiety and depression:** cognitive behavioural therapy is first line of treatment, but pharmacological management may be needed.

Resources for Healthcare Professionals and Patients

Source 1. For Healthcare Professionals

- COVID-19 Miniseries Episode 65: Restoring Function for Long-Haulers <https://ce.mayo.edu/internal-medicine/content/mayo-clinic-talks-covid-19-miniseries-episode-65-restoring-function-long-haulers>

Source 2. Post-COVID Conditions: Information for Healthcare Providers (CDC 2021)

- **Aim:** These are guidelines for health care providers last updated April 8, 2021
- Defined as experiencing “new, reoccurring, ongoing symptoms, and clinical findings” > 4 weeks after an infection or after recovery; symptoms are potentially caused by reinfection, pre-existing conditions, or other diagnoses
- Key points about symptoms:
 - Multi-organ effects: cardiovascular, pulmonary, psychiatric, renal, neurologic, dermatologic
 - Autoimmune conditions, multisystem inflammatory syndrome (MIS), and persisting health effects
 - Unknown if these effects may lead to chronic illness
 - Post-COVID conditions may include effects from treatment and hospitalization, such as post-intensive care syndrome, weakness, PTSD
 - **Symptoms also occur in people with mild and asymptomatic COVID**
 - Mood changes can occur (e.g., depression and anxiety)
 - Difficulty breathing (with and without abnormal imaging and function testing), difficulty thinking and concentrating, fatigue
 - Pain in chest, muscles and joints
 - Coughing
 - Dizziness and headache
- In patient-led surveys, PEM (post-exertional malaise) has been reported
- Older patients and patients with underlying health conditions may have higher risk of severe symptoms; younger patients have also reported symptoms lasting for months after acute illness

Post-acute COVID clinics across the United States provide aftercare treatment and survivor support groups are affected by COVID-19 (see [Table 2: Scan of Canadian programs/services for those experiencing post-acute COVID-19](#))

Jurisdiction	Location of program/service	Program approach	Other

British Columbia	BC Provincial Health Services Authority: The Post COVID-19 Interdisciplinary Care Network	Background: The Post COVID-19 Interdisciplinary Care Network coordinates care, research, and education for recovery of patients with ongoing COVID-19 care needs. Demographics: not described Eligibility for participation: · Available to patients across BC who meet clinical eligibility criteria (not listed) · Must have had a positive COVID-19 test (unless patient was sick during early stages of pandemic from January to May 2020) · Patients must be referred by their primary care provider using the clinic referral form. Approach: · Across the province, there are 3 post COVID-19 recovery clinics. · Located at St. Paul's Hospital, Vancouver General Hospital · Virtual care options may be available in some cases. · Network is provided in partnership between regional health authorities, research organizations, and patients.	Education tools and resources are available to those who do not meet clinical eligibility criteria.
-------------------------	---	---	--

Alberta	Alberta Health Services Post-COVID Pulmonary Clinics	Background: Since December 2020, 3 post-COVID pulmonary clinics have been established for Albertans in the following locations: · Peter Lougheed Centre (Calgary) · Rockyview General Hospital (Calgary) · Kaye Edmonton Clinic Demographics: not described. Eligibility for participation: · Patient must be referred by family/primary care physician · Patient must have documented positive COVID swab · Patient must have persistent pulmonary/chest symptoms for at least 12 weeks post original diagnosis date Approach: · Once referred and triaged to the patient's preferred location, the patient will be seen by a physician and connected with a physiotherapist affiliated with the clinic as required. · This clinic has a focus on chronic pulmonary symptoms post COVID-19 infection. If there are non-pulmonary medical concerns, physicians should refer patients to the appropriate specialist services.	
----------------	--	---	--

	Edmonton North Primary Care Networks (PCN): COVID-19 Recovery Clinic	Background: The Edmonton North PCN created the COVID-19 Recovery Clinic to provide specialized care and follow up to people who were diagnosed with COVID-19 and are now in recovery but still experiencing symptoms. Demographics: not described Eligibility for participation: - Referrals accepted from ALL Edmonton Zone physicians - Program designed for adult patients who are >10 weeks post COVID-19 positive still experiencing ongoing symptoms. - Referral form includes the date that patient tested positive, the symptoms they are experiencing, and any treatments tried to date. Approach: - Care is provided through a novel mix of on-site and virtual clinics that allow for multidisciplinary engagement with patients, allied health professionals, primary care physicians and a network of subspecialists. - The clinic is integrated into the local research community, enabling fast-tracking of provincial research programs and knowledge translation to clinic professionals. - In-person appointments will take place at the main Edmonton North PCN main location (Northgate Centre) or at a specialist's office.	Specialist referral process provided by ConnectMD , a service that connects family doctors in the Edmonton and North zones with over 35 specialty groups for advice.
--	--	---	--

		The clinic's multidisciplinary team includes: · Cardiology · Exercise therapy · Mental health support · Neurology · Nursing · Physiotherapy · Pulmonary · Rheumatology · Social work support	
--	--	---	--

	Alberta Health Services: Getting Healthy after COVID-19	Background: A collection of self-management and educational tools for patients experiencing long COVID-19. Demographics: not applicable. Eligibility for participation: available for free online, treatment resources linked available to Albertans. Approach: • Educational and management resources for recovery, ranging from breathing tips, advice on managing brain fog, mental health, and COVID-19 and pregnancy. • Links users to resources for long COVID-19 available in their region, including AHS pulmonary/respiratory care clinics.	
Quebec	Montreal Clinical Research Institute (Montreal) – Post-COVID Clinic See related CBC media article.	Program background: Clinic provides support for eligible patients for 1 year, 3-4 visits Demographics: not described Eligibility for participation: • Infected with COVID-19 for a minimum of 28 days; OR • Essential health worker at risk of being exposed to COVID-19; OR • Have been exposed to COVID-19. Approach (detailed assessment that includes): • blood tests • measurement of lung function • medical examination	This clinic is a part of a research program led by infectious diseases specialist, Dr. Emilia Liana Falcone. Offered free-of-charge.

		• NPS • Continuous glucose monitoring • Appointment for ECG (completed at the CHUM) • Pedometer, etc	
	Sherbrooke (La Clinique ambulatoire post-COVID – L’Hôtel-Dieu Sherbrooke) See related media articles: CBC and Le Journal de Montreal. **all information on the clinic is obtained from media sources.	Background: • Opened in May 2020 (first in the province) Demographics: • As of January 2021, clinic has served approximately 250 persons; • 2/3 of patients are women with a median age of 50 years; • 1/3 patients report experiencing persistent symptoms (manifestations and severity of symptoms vary) Eligibility: • Patients did not require hospitalization during acute COVID-19 (there is no indication if this clinic serves those hospitalized) Approach: • Care is supported by the clinic with referral to specialists if necessary Plans for expansion to an interprofessional team (PT & OT)	Led by Dr Alain Piche (infectious diseases specialist) Patients are also invited to participate in the Biobanque québécoise de la COVID-19

	Chicoutimi	Unable to find any details on Chicoutimi clinic – other than media articles that suggest this clinic is in operation (see media articles linked to other Quebec clinics).	
--	------------	---	--

- Table)

Source 3. For Patients

- Pain Toolkit for Long COVID-19 - <https://www.paintoolkit.org/news/article/brand-new-website-for-people-living-long-covid-long-haulers>
- John Hopkins FAQ - <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/covid-long-haulers-long-term-effects-of-covid19> .

Evidence Tables

Table 1: Summary of Evidence on Risk Factors for Post-Acute COVID-19

	Public Health Ontario, April 19, 2021	Torres-Castro et al., 2020	AHS COVID-19 Scientific Advisory Group, November 2020	CD C, 2021	NHS, 2021	Iwu et al., 2021	Skyes et al., February 2021	Nalbandian et al., 2021	Del rio et al., Oct. 2020	Royal Australian College of Practitioners, n.d.	Buttery et al. 2021
Neurological and cognitive											
Fatigue	√ 30-78%		√ 4-6 weeks: 16.4-73% 8-12 weeks: 9.5-62%		√	√	√ Extreme fatigue: 39.6%	√	√	√	√ < 4 weeks: 80% 4-8 weeks: 82.2% 8-12 weeks: 83.5% > 12 weeks: 84.1%
Headache	√ 18-50%		√ Headache: 4-6 weeks: 15-50% 8-12 weeks: 7-22%	√	√			√	√	√	
Attention disorder, memory loss, anxiety, depression	√ 11-55%				√	√	√ Anxiety: 47.8%	√ Anxiety and depression only		√ Anxiety and depress	

										ion only	
Sleep disorders	√ 11-65%		√ 4-6 weeks: N/A 8-12 weeks: 10-39%		√		√ 35.1%	√		√	√ < 4 weeks: 41.5% 4-8 weeks: 47.2% 8-12 weeks: 46.2% > 12 weeks: 47.6%
Smell/taste dysfunction	√ 10-43%		√ Loss of smell: 4-6 weeks: 5-36% 8-12 weeks: 9.7-39% Loss of taste: 4-6 weeks: 9-32% 8-12 weeks: 1.17-23%		√				√	√	√ < 4 weeks: 44.4% 4-8 weeks: 30.8% 8-12 weeks: 26.8% > 12 weeks: 26.2%
Cognitive impairment/ brain fog			√ 4-6 weeks: 12-25.4% 8-12 weeks: 12-28%					√	√	√	
Mood changes				√			√ 37.3%		√		√
Dizziness/vertigo				√	√				√		
Pins and needles					√						
Tinnitus/ earaches					√						
Post traumatic stress disorder				√				√		√	√ < 4 weeks: 13% 4-8 weeks: 15%

											8-12 weeks: 17.3% > 12 weeks: 18.9%
Disautonomia								√			
Seizures									√	√	
Encephalitis									√		
Stroke										√	
Encephalopathy										√	
Myelitis										√	
Critical care neuropathy/myopathy										√	
Respiratory											
Cough	√ 20-27%		√ 4-6 weeks: 7-33% 8-12 weeks: 1.81-27%	√	√	√				√	√ < 4 weeks: 91.1% 4-8 weeks: 93.1% 8-12 weeks: 93% > 12 weeks: 91.5%
Shortness of breath/breathing difficulty/dyspnea	√ 17-55%		√ 4-6 weeks: 1.53-56% 8-12 weeks: 1.53-48%	√	√	√	√ 60%	√	√	√	√ < 4 weeks: 50% 4-8 weeks: 44.7% 8-12 weeks: 42.9% > 12 weeks: 40.3%
Altered diffusion capacity		√ 39%						√	√ 25-53%		
Restrictive pattern		√ 15%						√			
Obstructive pattern		√ 7%									
Sore throat					√						

Decreased exercise capacity								√			
Hypoxia								√			
Ground-glass opacities								√			
Fibrotic changes on imaging								√			
Diminished respiratory muscle strength									√ 49%		
Persisting interstitial lung disease										√	
Pneumonia/lung cavitation										√	
Complications of intubation/ventilation										√	
Cardiovascular											
Chest pain	√ 12-24%		√ 4-6 weeks: N/A 8-12 weeks: 13-31%	√	√			√	√	√	
Tachycardia	√ 11-34%							√	√	√	
Palpitations	√ 10-40%				√			√			
Thromboembolic events and								√	√	√ VTE	

hypercoagulable state											
Cardiometabolic demand								√			
Myocardial fibrosis/scarring/ injury/ inflammation								√	√ 60%		
Autonomic dysfunction								√			
Myocarditis									√ 46%	√	
Myocardial infarction, pericarditis or heart failure										√	
Other											
Joint and/or muscle pain and weakness	√ 19-44%		√ 4-6 weeks: 5-15% 8-12 weeks: 6-28%	√	√				√	√	√ < 4 weeks: 43.7% 4-8 weeks: 47.6% 8-12 weeks: 49.1% > 12 weeks: 52.8%
Fever/chills/ sweats	√ 12-24%				√ Fever only					√ Fever only	
GI symptoms (diarrhea, nausea, vomiting, loss of appetite)	√ 12-21%				√					√	√ Loss of appetite or weight loss : <4 weeks: 25.9% 4-8 weeks: 25.5% 8-12 weeks: 19.7%

											> 12 weeks: 23.1%
Rashes				√					√		
Multisystem inflammatory syndrome/hyper inflammatory state				√				√			
Auto-immune conditions				√							
Post-intensive care syndrome				√							
Myalgia							√ 51.5%	√		√	
New or worsening diabetes mellitus, thyroiditis, or bone demineralization.								√		√	
Altered gut microbiome								√			
Hair loss								√			√ <4 weeks: 3.7% 4-8 weeks: 4.9% 8-12 weeks: 9.5% > 12 weeks: 13.3%
Anemia										√	
Renal dysfunction										√	
Reduced quality of life										√	
Pressure sores										√	

Table 2: Scan of Canadian programs/services for those experiencing post-acute COVID-19

Jurisdiction	Location of program/service	Program approach	Other
British Columbia	BC Provincial Health Services Authority: The Post COVID-19 Interdisciplinary Care Network	Background: The Post COVID-19 Interdisciplinary Care Network coordinates care, research, and education for recovery of patients with ongoing COVID-19 care needs. Demographics: not described Eligibility for participation: · Available to patients across BC who meet clinical eligibility criteria (not listed) · Must have had a positive COVID-19 test (unless patient was sick during early stages of pandemic from January to May 2020) · Patients must be referred by their primary care provider using the clinic referral form. Approach: · Across the province, there are 3 post COVID-19 recovery clinics. · Located at St. Paul's Hospital, Vancouver General Hospital · Virtual care options may be available in some cases. · Network is provided in partnership between regional health authorities, research organizations, and patients.	Education tools and resources are available to those who do not meet clinical eligibility criteria.

Alberta	Alberta Health Services Post-COVID Pulmonary Clinics	Background: Since December 2020, 3 post-COVID pulmonary clinics have been established for Albertans in the following locations: · Peter Lougheed Centre (Calgary) · Rockyview General Hospital (Calgary) · Kaye Edmonton Clinic Demographics: not described. Eligibility for participation: · Patient must be referred by family/primary care physician · Patient must have documented positive COVID swab · Patient must have persistent pulmonary/chest symptoms for at least 12 weeks post original diagnosis date Approach: · Once referred and triaged to the patient's preferred location, the patient will be seen by a physician and connected with a physiotherapist affiliated with the clinic as required. · This clinic has a focus on chronic pulmonary symptoms post COVID-19 infection. If there are non-pulmonary medical concerns, physicians should refer patients to the appropriate specialist services.	
----------------	--	---	--

	Edmonton North Primary Care Networks (PCN): COVID-19 Recovery Clinic	Background: The Edmonton North PCN created the COVID-19 Recovery Clinic to provide specialized care and follow up to people who were diagnosed with COVID-19 and are now in recovery but still experiencing symptoms. Demographics: not described Eligibility for participation: - Referrals accepted from ALL Edmonton Zone physicians - Program designed for adult patients who are >10 weeks post COVID-19 positive still experiencing ongoing symptoms. - Referral form includes the date that patient tested positive, the symptoms they are experiencing, and any treatments tried to date. Approach: - Care is provided through a novel mix of on-site and virtual clinics that allow for multidisciplinary engagement with patients, allied health professionals, primary care physicians and a network of subspecialists. - The clinic is integrated into the local research community, enabling fast-tracking of provincial research programs and knowledge translation to clinic professionals. - In-person appointments will take place at the main Edmonton North PCN main location (Northgate Centre) or at a specialist's office.	Specialist referral process provided by ConnectMD , a service that connects family doctors in the Edmonton and North zones with over 35 specialty groups for advice.
--	--	---	--

		The clinic's multidisciplinary team includes: · Cardiology · Exercise therapy · Mental health support · Neurology · Nursing · Physiotherapy · Pulmonary · Rheumatology · Social work support	
--	--	---	--

	Alberta Health Services: Getting Healthy after COVID-19	Background: A collection of self-management and educational tools for patients experiencing long COVID-19. Demographics: not applicable. Eligibility for participation: available for free online, treatment resources linked available to Albertans. Approach: • Educational and management resources for recovery, ranging from breathing tips, advice on managing brain fog, mental health, and COVID-19 and pregnancy. • Links users to resources for long COVID-19 available in their region, including AHS pulmonary/respiratory care clinics.	
Quebec	Montreal Clinical Research Institute (Montreal) – Post-COVID Clinic See related CBC media article.	Program background: Clinic provides support for eligible patients for 1 year, 3-4 visits Demographics: not described Eligibility for participation: • Infected with COVID-19 for a minimum of 28 days; OR • Essential health worker at risk of being exposed to COVID-19; OR • Have been exposed to COVID-19. Approach (detailed assessment that includes): • blood tests • measurement of lung function • medical examination	This clinic is a part of a research program led by infectious diseases specialist, Dr. Emilia Liana Falcone. Offered free-of-charge.

		• NPS • Continuous glucose monitoring • Appointment for ECG (completed at the CHUM) • Pedometer, etc	
	Sherbrooke (La Clinique ambulatoire post-COVID – L’Hôtel-Dieu Sherbrooke) See related media articles: CBC and Le Journal de Montreal. **all information on the clinic is obtained from media sources.	Background: • Opened in May 2020 (first in the province) Demographics: • As of January 2021, clinic has served approximately 250 persons; • 2/3 of patients are women with a median age of 50 years; • 1/3 patients report experiencing persistent symptoms (manifestations and severity of symptoms vary) Eligibility: • Patients did not require hospitalization during acute COVID-19 (there is no indication if this clinic serves those hospitalized) Approach: • Care is supported by the clinic with referral to specialists if necessary Plans for expansion to an interprofessional team (PT & OT)	Led by Dr Alain Piche (infectious diseases specialist) Patients are also invited to participate in the Biobanque québécoise de la COVID-19

	Chicoutimi	Unable to find any details on Chicoutimi clinic – other than media articles that suggest this clinic is in operation (see media articles linked to other Quebec clinics).	
--	------------	---	--

Table 3: US jurisdictional scan of programs/services for those experiencing post-COVID after effects

State	Location of program/service	Program approach	Other
Connecticut	Hartford HealthCare's COVID Recovery Center - focused on health and healing after COVID-19 NBC news article .	Program Background: see recovered COVID patients looking for guidance and help as they continue to have symptoms such as fatigue, cough, shortness of breath, confusion, depression and memory issues, among others Demographics: not included Eligibility for participation: not included Approach: • have a multidisciplinary approach to take care of illness and put on the path of recovery • use resources to provide the best possible outpatient care • offer diagnostics and medical treatment, as well as therapy and support groups	

	Nuvance Health's COVID Recovery Program in Danbury - treating patients with persistent symptoms after COVID-19 infection	Program Background: the Nuvance Health COVID Recovery Program (CRP) can help patients with diagnosis and treatment options to maximize function and to reduce symptoms post-COVID-19 infection Demographics: not included Eligibility for participation: · 18 years or older and have had a COVID-19 positive test result (PCR) · must be 4 weeks or longer from the onset of first symptom and still have Symptoms · can see people who were hospitalized and those who had a mild to moderate illness Approach: · first step is a Virtual Visit with one of Nuvance Health's CRP physicians to review symptoms, medical history and more · patients may need to see one or more specialists: program's physicians can determine what referrals are needed while coordinating care throughout recovery · program's care team will work closely with patients and specialists to create a collaborative and customized plan of care · will help establish care with one of our caring clinicians if patient does	
--	---	---	--

		not have a Primary Care Physician	
District of Columbia	George Washington University COVID-19 Recovery Clinic – to support patients who struggle with long-term symptoms after COVID-19 Related news article.	Program Background: multidisciplinary clinic offering specialized care for patients recovering from COVID-19 Demographics: not included Eligibility for participation: not included Approach: · multi-disciplinary clinic offers up-to-date medical knowledge, compassionate care, and supportive resources in the service of patients recovering from COVID-19 · team of experts will conduct a comprehensive assessment and create an individualized plan to help every patient achieve	Co-directed by Dr. Monica Lypson and Dr. Aileen Chang from the Division of General Internal Medicine, and Dr. Hana Akselrod from the Division of Infectious Diseases, with additional support from Pulmonology,

		optimal physical and mental recovery after the initial assessment, patients will be further directed for specific tests or specialist consultations as needed	Geriatrics & Palliative Medicine, Memory Clinic, Cardiology, Psychiatry and Rehabilitation Medicine
Alabama	Birmingham, (University of Alabama) See: Post COVID Treatment Program at UAB to help patients with persistent COVID-19 symptoms - News UAB	Background: Multidisciplinary program started in 2020, was one of the first of its kind at the time of article release Demographics: not described other than caring for patient with a variety of symptoms Eligibility: Self-referral, physician referral, and the outreach program through a coordinator that connects to patients discharged after four to six weeks for an assessment Must have previous positive COVID-19 test, and with lasting symptoms at least three weeks after last positive test Approach: Using an algorithm to determine care needs and direct patients to a team of experts Not a physical clinic, but patients are directed to clinics for further specialized care Team of: neurology, psychiatry, cardiovascular disease, clinical immunology and rheumatology, infectious diseases, pulmonary, allergy and critical care medicine	Led by Turner Overton, professor of medicine and medical director of the Post COVID Treatment Program

Indiana	Parkview Post-COVID Clinic in Fort Wayne - offers care, support for 'long haulers' News article.	Program Background: provide care and support for people with post-acute sequelae of COVID-19 to help restore patients to their pre-COVID function Demographics: patients will need to obtain a referral through their PPG primary care provider Eligibility for participation: · ideal for patients who experienced new or worse symptoms such as brain fog, headaches, sensory disturbance, loss of taste and smell, fatigue or weakness · patients must be at least 18 years old, have a confirmed COVID-19 diagnosis, and have lingering symptoms at least four weeks post-diagnosis Approach: · take a multidisciplinary approach to care, offering neurology, physiatry, neuropsychology, occupational therapy, physical therapy and pharmacy services · also partnered with the Parkview Mirro Center for Research and Innovation · evaluation will be individualized based on each person's concerns, and management recommendations will be based on the most up-to-date, evidence-based medical practice	Led by the Parkview Physicians Group (PPG) – Neurology team.
-----------------------	--	--	---

		goal is to restore the function and wellbeing of patients one at a time	
--	--	---	--

Ohio	Cleveland reCOVER Clinic – for patients with long COVID syndrome See related news article.	Program background: for patients with COVID-19 symptoms lasting more than 28 days Demographics: · serves patients throughout Northeast Ohio via virtual platform · sees Cleveland Clinic patients by referral, but plans to expand services to any long COVID patient in the future Eligibility for participation: · for adult patients who have had a positive PCR test result and have persistent COVID-19 symptoms that have lasted 28 days or longer after their initial positive PCR test result · not only for patients with severe cases, patients may have had mild infection, yet symptoms have persisted more than four weeks or potentially worsened after time Approach: · collaborates with Cleveland Clinic specialists from 18 different clinical areas, including cardiology, pulmonology, dermatology, ear nose and throat and neurocognition · first undergo a series of evaluations and exams, including an in-depth health history and questionnaires; cardiac,	Led by Kristin Englund, M.D., an infectious disease physician. William Lago, M.D., a family medicine physician involved in the development of the reCOVER clinic.
------	--	--	---

		pulmonary, and physical therapy tests; blood tests, and neurocognitive and behavioral health screenings · once complete, patients will meet with reCOVer clinic providers to discuss the results and individual next steps · depending on a patient's results, symptoms and needs, clinical experts will determine the best care path for the patient moving forward and connect them with Cleveland Clinic specialists with specific expertise in long COVID-19 for continued care	
--	--	---	--

Ohio	Cleveland See: Related article.	Background: Virtual clinic established in February of 2021 Demographics: most patients have experienced issues breathing Eligibility: Patients with symptoms that remain 4 weeks or longer after recovery Approach: • Appointments with a behavioral health specialist, family physician, rheumatology nurse practitioner, and internal physician to determine treatment plan May be prescribed medication to aid with symptoms	
Oregon	OSHU Long COVID-19 Program in Portland - to better serve patients with chronic coronavirus symptoms Related news article.	Program Background: for COVID-19 patients who have experienced symptoms for more than a month launched March 2021 Demographics: · the program is initially serving existing OHSU patients · by late spring, the program aims to expand by also serving patients from throughout the broader OHSU Health system Eligibility for participation: · specifically designed for the so-called long-haulers who continue to have fatigue, trouble breathing, heart palpitations and other symptoms months after their initial illness	Eric Herman, M.D., program's lead physician.

		· the program serves both adults and children Approach: · each participating patient's unique needs are first assessed through an initial intake appointment · the long COVID-19 team will develop a care plan that will be shared with, and managed by, the patient's primary care provider · patients may also be referred to specialists to address specific coronavirus-related symptoms and conditions · providers involved in the program specialize in pulmonology, cardiology, neurology, primary care and physical rehabilitation, among other areas	
--	--	---	--

Pennsylvania	St. Luke's COVID Recovery Clinic in Bethlehem (news article)	Program Background: dedicated to the treatment of post-COVID-19 patients with lingering symptoms Demographics: not included Eligibility for participation: patients with persistent symptoms beyond four weeks are advised to go to their St. Luke's primary care physician, who will be able to evaluate them and may refer them to the COVID Recovery Clinic for further treatment by appropriate medical specialists Approach: · the program promises a coordinated, multidisciplinary approach of various medical specialists to Post-Acute Sequelae of COVID · participants will benefit from specialized evaluation and a personalized treatment plan · depending on a patient's specific symptoms and their severity, treatment can include cognitive and memory retraining, physical and occupational therapy, medication and group therapy for behavioral health issues as well as other interventions to address neurologic, pulmonary and cardiac problems · taken steps to help providers manage PASC, such as building a "smart set" algorithm into the	
----------------------------	---	---	--

		electronic medical record system: guides physicians on ordering tests and imaging scans based on patients' symptoms	
	Temple Health Post-COVID Recovery Clinic in Philadelphia - for COVID-19 long-haulers recover and improve their quality of life ABC news article.	Program Background: Post-COVID Recovery team aims to help better manage “long-haul” symptoms, whether mild or severe, and may improve ability to fully recover Demographics: not included Eligibility for participation: whether just been discharged and need follow-up care, or been dealing with ongoing symptoms at home, patients can be seen at one of the Post-COVID Recovery Clinic locations Approach: bring together leading specialists in lung disease to address the full breadth of COVID-19 symptoms and needs, using the most	Managed by the experts at the Temple Lung Center

		up-to-date treatments available · full array of treatment options including pulmonary rehabilitation, supplemental oxygen therapy, medications, and more advanced treatments and procedures	
Missouri	Washington University Care and Recovery After COVID Clinic in St. Louis (news article)	Program Background: for patients with persistent symptoms or complications of COVID-19 Demographics: not included Eligibility for participation: accepting patients who have had a confirmed positive case of COVID-19 by a nasal swab test, a saliva test, or a blood antibody test Approach: · provides coordinated and collaborative care among 11 specialties · visits include a comprehensive assessment of acute COVID illness, symptom history, and current symptoms care often includes screening for potential complications, symptom-based evaluation, supportive counseling and recommendations and referrals as needed with specialists	

New Jersey	St. Peter's Healthcare System COVID-19 Recovery Program in New Brunswick - intended to help patients who are still experiencing long-term effects of a COVID diagnosis	Program Background: developed the COVID-19 Recovery Program to address the lingering complications endured by many post-COVID patients Demographics: Eligibility for participation: Patients who have previously tested positive for or been diagnosed with COVID-19 are eligible to enroll in the CRP program Approach: · multi-specialty care from experienced physicians · initial screening completed by phone for baseline assessment · schedule additional tests or services if deemed appropriate · referrals for specialist care if required, including physical therapy, pulmonologists, neurologists, cardiologists, or gastroenterologists · program navigator will monitor recovery and care, follow-up on lab work, tests, and appointments, and ensure the necessary support systems are in place to aid in journey to recovery	Co-directed by Dr. Amar Bukhari, MD and Dr. Nilam Srivastava, MD
--------------------------	---	--	---

New Jersey	Browns Mills, (Deborah Heart and Lung Center) See: New Jersey heart center opens post-COVID-19 clinic (beckershospitalreview.com)	Background: Post-COVID recovery program that began February 12, 2021 Demographics: not described Eligibility: • Patients with lasting symptoms six weeks after recovery, and those with new medical problems as a result of COVID-19 infection • Includes patients who were hospitalized, who were not hospitalized, who previously tested positive, and those with underlying medical conditions Approach: • Individualized treatment plan based on evaluation and diagnoses Physical therapy, cardiology, hematology, radiology, pulmonary rehab	Led by Andrew Martin, chair of pulmonary medicine
New Jersey	Edison, (Hackensack Meridian Health) See: Hackensack Meridian Health opens first COVID-19 recovery center in New Jersey (beckershospitalreview.com)	Background: Started July 12, 2021 Demographics: Eligibility: Patients recovered from COVID-19 who experience lasting symptoms Approach: Telescreening by physician Individualized care plan and connecting patients to specialists Behavioral, lung, and heart care	Laurie G. Jacobs, MD, chair of the internal medicine department

Texas	Baylor Post COVID Care Clinic in Houston - for COVID-19 long-haulers News article.	Program Background: providing care for long-haul COVID-19 through the Post COVID Care Clinic, where patients can receive treatment for the lingering symptoms or new side effects after having the virus Demographics: not included Eligibility for participation: not included Approach: · The Post COVID Care Clinic will provide a questionnaire that will assess how COVID-19 has affected the patient · This is followed by a visit with a pulmonary specialist who will provide an evaluation and a management plan personalized to each case · the clinic offers both in-person and virtual appointments	Dr. Fidaa Shaib, associate professor of medicine in the section of pulmonary, critical care and sleep medicine at Baylor
	UTMB Post COVID Recovery Clinic in Galveston – helps patients resume life as pre COVID-19, returning to daily routine and favorite activities Related news article.	Program Background: offer a patient-focused, comprehensive, clinic-based program with virtual visit capabilities Demographics: limited to adults Eligibility for participation: assist any individual who previously tested positive for COVID-19, whether hospitalized or not, and who continues to experience symptoms they believe are related to the virus Approach: · during initial recovery from COVID-19, team of physicians, practitioners, and mental health	

		professionals available to support patients · they will evaluate condition and help with recovery strategies to support rehabilitation · common symptoms we're helping patients address include breathlessness, fatigue, cough, weakness, anxiety and depression	
--	--	--	--

Colorado	Aurora (UCHealth University of Colorado Hospital on the Anschutz Medical Campus.) See: Related article.	Background: Clinic to be developed Demographics: not described Eligibility: For patients who have been in the ICU for a long time period · Patients suffering from delirium, shock, and respiratory failure · Patients requiring intensive care and ventilator support · Social and emotional support Approach: · Support from pulmonology; physical, occupational and speech therapy; pulmonary rehabilitation; physical medicine and rehabilitation; and psychiatry	Led by Sarah Jolley, assistant professor of pulmonary sciences and critical care
-----------------	---	---	---

		· Telehealth to provide care, plans to create a physical space in the future	
California	San Francisco, Parnassus (Pulmonary practice) See: Related article.	Background: Offers evaluation and treatment for patients with various lung diseases. Follow-ups for patients recovered from COVID-19. Demographics: Regular intervals for 12 months after hospitalization Eligibility: Doctor referral is required Approach: · Uses specialists from pulmonology, geriatrics and psychiatry · Patients who were hospitalized or have persistent pulmonary symptoms	

California	Los Angeles, (Cedars-Sinai Medical Group) See: Related article.	Background: COVID-19 recovery program that began January 2021 Demographics: not described Eligibility: Requires referral from physician - Have had a confirmed COVID-19 infection and be experiencing persistent symptoms Approach: - in-person evaluation from an infectious diseases or pulmonary medicine expert specialists include: cardiologist, pulmonologist, neurologists and psychiatrists	patients may access clinical trials program works with Smidt Heart Institute's Post-COVID-19 Cardiology Program and the Cedars Sinai Department of Medicine's Post-ICU Clinic
California	Orange County, (St. Jude Medical Center) See: OC Hospital Develops Program to Help COVID Long Haulers (spectrumnews1.com)	Background: Recovery program started in 2020 Demographics: Describes one patient treated by the program experiencing extreme confusion, foggy, and fatigue after recovery Eligibility: for patients who experience lasting symptoms even after testing negative Approach: Physical exercises, breathing exercise, and speech therapy	

Pennsylvania	Philadelphia, Penn Medicine Post-COVID Assessment and Recovery Clinic at Penn Medicine See: Post-COVID Assessment and Recovery Clinic - Penn Medicine Three locations: · Penn Institute for Rehabilitation Medicine at Penn Medicine Rittenhouse, Penn Medicine Cherry Hill and Penn Medicine Radnor.	Background: Clinic was created after the appearance of patients at the hospital experienced post-COVID symptoms Demographics: not described Eligibility: Referrals · For patients with lingering symptoms after recovery Approach: · Telehealth visits Multidisciplinary assessment and patient evaluation to determine individual needs: · Medication reconciliation · Rehabilitation Needs Screen: Bowel, bladder, pain, ADL/iADL performance, cognition, equipment needs, mobility, sleep, skin · Pulmonary Functioning Screen · Criteria established to automatically refer back to Pulmonary · Montreal Cognitive Assessment (MoCA) · Hospital Anxiety and Depression Scale (HADS) · Impact of Event Scale-6 (IES-6) · General Health Slider · A group of rehabilitation specialists, Pulmonary and Critical Care Medicine	Patients will be logged into a registry for research efforts
----------------------------	--	--	---

New Jersey	Morristown See: Related article. See this article for locations.	Background: Launched in October 2020, a multidisciplinary program based in Cedar Knolls and Summit. Demographics: not described Eligibility: Patients experiencing lasting for months Approach: · Includes pulmonary, cardiology, neurology, rehabilitation medicine and primary care as well as a peer support program · Designing a tailored plan for patients and guiding them to appointments with specialists	Led by Scott Lauter, chief medical officer for Atlantic Medical Group.
Massachusetts	Boston Spaulding Rehabilitation Hospital, at various outpatient and rehabilitation centers. See: Related article.	Background: Helping patients address physical, mental health, or cognitive issues Demographics: not described Eligibility: Patients who have tested positive and have since recovered Approach: · Team of, ‘physiatrists, physical therapists, occupational therapists, speech language pathologists, and case managers.’ · Virtual visits available · Initial evaluation, followed by individual exercise plan to address any physical symptoms	

Massachusetts	Concord, (Emerson Hospital) See: COVID-19 Recovery Program Emerson Hospital	Background: Recovery program with a team with experience working with COVID-19 patients in the hospital Demographics: not described Eligibility: Physician referral Offers in-person or telehealth appointments based on need Patients who required hospitalization, patients who did not require hospitalization but are recovering Approach: physical, occupational, and speech therapists Bed-rest impairments, physical and cognitive decline, cardiovascular endurance, joint mobility, speech, swallowing, and cognition	
New York	New York City, (Mount Sinai Health System) See: Mount Sinai Health System launches center for COVID-19 recovery (beckershospitalreview.com)	Background: Centre for recovery and for researching the long-term effects of COVID-19, started May 13, 2020 Demographics: not described Eligibility: For hospitalized patients and patients who were not hospitalized Approach: Individualized treatment plan from many specialties: primary care, pulmonary medicine, cardiology, infectious disease and psychiatry, as well as social workers and pharmacists	Led by Dennis S. Charney, MD, president for academic affairs at Mount Sinai Health System

		A registry of patients to be collected and used for collection of sociodemographic behaviors, underlying conditions, mental health conditions and medications	
New York	Bronx See: Related article.	Background: Follow-ups for patients and chronic conditions Demographics: not described Eligibility: Internal referral or referral by provider Referrals · Patient who has had a COVID-19 test (PCR or IgG antibody), regardless of severity. · “Patients with new or residual symptoms · New or worsening impairments in their physical, cognitive or emotional health after a recent hospitalization” Approach: · Telemedicine and in-person visits	Led by Marjan M. Islam, Division of Pulmonary Medicine

New York	Valhalla, (Westchester Medical Center Health Network) See: WMCHHealth Post-COVID-19 Recovery Program (westchestermedicalcenter.org)	Background: Post-COVID-19 program for on-going recovery created as cases rise in the area Demographics: not described Eligibility: Lasting symptoms after a known or suspected COVID-19 infection Lists these lasting symptoms as: Fatigue Cough Shortness of breath Headache Muscle weakness and joint pain Impact to the heart, lungs, brain, and blood cells Mental fog, confusion, anxiety, depression Lists high-risk patients with underlying medical conditions and based on age but does not seem to give priority to treating only these patients. Approach: Physical exam by physician and review of patient history • Patient navigator creates individualized plan • primary care, pulmonology, cardiology, nephrology, psychiatry, radiology, and other specialties patients without a primary care physician will be provided with one	
------------------------	--	---	--

Kentucky	Louisville See: Related article.	Background: COVID follow-up clinic for children, since January 2021 Demographics: For children and teenagers Eligibility: Physician referral required Suspected or confirmed COVID-19 diagnosis Symptoms that last two weeks or longer Approach: · Telehealth visits or in person · Pediatric infectious disease specialist	Led by Gary S Marshall, chief of pediatric infectious diseases for Norton Children's and the UofL Department of Pediatrics
Connecticut	New Haven See: Related article.	Background: Recovery program since 2020; evaluation and treatment Demographics: For those experiencing 'persistent shortness of breath, difficulty with exercise and usual daily activities, cough and chest discomfort' regardless of hospitalization and severity of illness Eligibility: Physician referral or self-referral Approach: Personalized treatment plan from "pulmonary experts, physical therapists and social worker have worked closely with colleagues in neurology, cardiology, psychiatry and other medical specialties"	Patients may also be referred to receive monoclonal antibody treatment

Maryland	Glen Burnie, (University of Maryland Baltimore Washington Medical Center) See: Related article.	Background: Program created in 2020 for patients with long-term effects after treatment in the intensive care unit Demographics: The critical care team identifies patients needing a follow-up Eligibility: Patients will be evaluated according to: · ongoing oxygen needs, lung function, new or ongoing chronic health conditions, mental health concerns and socioeconomic needs · Specialized treatment plan according to the above factors Approach: Pulmonary, critical care, and primary care teams	
Illinois	Chicago, (Rush University Medical Center). See: Related article.	Background: Care clinic post-COVID established at Rush University Demographics: not described Eligibility: Patients experiencing one or more symptoms after COVID recovery Approach: Patients to work with a navigator to assist them Connect with social worker to evaluate social, physical, and emotional needs Connect with primary care and pharmacist	Directed by Monnie Wasse, MPH Patients can participate in research studies to find effective ways of combating COVID-19 illness, exploring the post-effects of COVID-19, and access treatments

Illinois	Chicago, (University of Chicago Medicine) See: Related website.	Background: COVID recovery clinic to support patients and connect them to additional care, started in 2020 Demographics: not described other than the article noting an increase in demand Eligibility: Patients must have had a previous positive COVID-19 test Approach: symptoms are described as fatigue and light-headedness, cough, shortness of breath and loss of taste or smell as well as mentioning online surveys by post-COVID-19 support groups that include joint pain, chest pain, chills and sweats, headaches, body aches and gastrointestinal issues are symptoms High-risk groups based on age and underlying conditions are mentioned, the article also suggests women may be more susceptible to these symptoms, but not mention of giving priority to only these patients Tests, and previously completed treatments will be reviewed Assessment of behavioral health needs, quality of life, and impact on work and family. Patients can be referred to specialists Patients may enroll in a registry to participate in research efforts and gain access to future treatment as it becomes available	Led by Lisa Vinci, specialist in general medicine
------------------------	--	---	--

Iowa	Cedar Rapids, (The Heart Center Mercy) See: Relevant website.	Background: A general support group for feelings related to COVID-19 Demographics: not described Eligibility: anyone can register Approach: Meeting held over Zoom	Groups held monthly by Kelly Weems
------	--	---	------------------------------------

References

Alberta Health Services COVID-19 Scientific Advisory Group (November 23rd, 2020). COVID-19 Scientific Advisory Group Rapid Evidence Report. Retrieved May 10 2021 from:
<https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-sag-chronic-symptoms-of-covid-rapid-review.pdf>

Baig, A. M. (2020). Chronic COVID Syndrome: Need for an appropriate medical terminology for Long-COVID and COVID Long-Haulers. *Journal of medical virology*.

Brown, D. (February 10th, 2021). Few resources for COVID-19 long-haulers suffering symptoms for months, new app offers hope. CBC News. Retrieved May 11 2021 from:
<https://www.cbc.ca/news/canada/hamilton/covid19-long-haulers-app-1.5904864>

Business Wire. (May 2021) *Pillars of Wellness: Canada's First Online Rehab Group Program For COVID Long Haulers*.

Buttery, S., Philip, K., Williams, P., Fallas, A., West, B., Cumella, A., ... & Hopkinson, N. S. (2021). Patient symptoms and experience following COVID-19: results from a UK wide survey. *Available at SSRN 3834303*.

Callard, F., & Perego, E. (2021). How and why patients made Long Covid. *Social Science & Medicine*, 268, 113426.

Camargo-Martínez, W., Lozada-Martínez, I., Escobar-Collazos, A., Navarro-Coronado, A., Moscote-Salazar, L., Pacheco-Hernández, A., ... Bosque-Varela, P. (2021). Post-COVID 19 neurological syndrome: Implications for sequelae's treatment. *Journal of Clinical Neuroscience*, 88, 219–225.
<https://doi.org/https://doi.org/10.1016/j.jocn.2021.04.001>

Centres for Disease Control and Prevention. (April 8, 2021) *Post-COVID Conditions: Information for Healthcare Providers*. Retrieved from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/post-covid-conditions.html>

Daynes, E., Gerlis, C., Chaplin, E., Gardiner, N., & Singh, S. J. (2021). Early experiences of rehabilitation for individuals post-COVID to improve fatigue, breathlessness exercise capacity and cognition—A cohort study. *Chronic Respiratory Disease*, 18, 14799731211015691.

Evidence Synthesis Network (May 7 2021). Understanding Long COVID. Retrieved from: <https://esnetwork.ca/briefings/understanding-long-covid-19/?highlight=understanding%20long%20COVID>

Evidence Synthesis Network (April 27 2021). Long COVID-19 Clinics. Retrieved from: <https://esnetwork.ca/briefings/long-covid-19-clinics/?highlight=long%20covid%20clinics>

Fernández-de-Las-Peñas, C., Palacios-Ceña, D., Gómez-Mayordomo, V., Cuadrado, M. L., & Florencio, L. (2021). Defining post-COVID symptoms (post-acute COVID, long COVID, persistent post-COVID): An integrative classification. *International Journal of Environmental Research and Public Health*, 18(5), 2621.

Gaber, T. (February 11th, 2021). Assessment and management of post-COVID fatigue. *Progress in Neurology and Psychiatry* 25(1) p. 36-39.

Greenhalgh, T., Knight, M., Buxton, M., & Husain, L. (2020). Management of post-acute covid-19 in primary care. *BMJ*, 370.

Iwu, C. J., Iwu, C. D., & Wiysonge, C. S. (2021). The occurrence of long COVID: a rapid review. *The Pan African Medical Journal*, 38.

Jacobs, L. G., & Baniqued, M. (2021). Clinical Programs for the Post-Acute Sequelae of COVID-19: What do they Offer? *Journal of Medicine and Public Health*, 2, 13–14.

Jason, L. A., Islam, M. F., Conroy, K., Cotler, J., Torres, C., Johnson, M., & Mabie, B. (2021). COVID-19 symptoms over time: comparing long-haulers to ME/CFS. *Fatigue: Biomedicine, Health & Behavior*, 1-10.

Kedor, C., Freitag, H., Meyer-Arndt, L., Wittke, K., Zoller, T., Steinbeis, F., Haffke, M., Rudolf, G., Heidecker, B., Volk, HD., Skurk, C., Paul, F., Bellmann-Strobl, J., Scheibenbogen, C. (February 8th, 2021). Chronic COVID-19 Syndrome and Chronic Fatigue Syndrome (ME/CFS) following the first pandemic wave in Germany – a first analysis of a prospective observational study. medRxiv. <https://doi.org/10.1101/2021.02.06.21249256>.

Ladds, E., Rushforth, A., Wieringa, S., Taylor, S., Rayner, C., Husain, L., Greenalgh, T. Developing services for long COVID: lessons from a study of wounded healers. *Clinical Medicine* Jan 2021, 21 (1) 59-65; DOI: 10.7861/clinmed.2020-0962

Leite, V. F., Rampim, D. B., Jorge, V. C., de Lima, M. D. C. C., Cezarino, L. G., da Rocha, C. N., ... & Study, R. (2021). Persistent symptoms and disability after COVID-19 hospitalization: data from a comprehensive telerehabilitation program. *Archives of physical medicine and rehabilitation*.

Mikkelsen, M.E., & Abramoff, B. (2021). COVID-19: Evaluation and management of adults following acute viral illness. *UpToDate*. <https://www.uptodate.com/contents/covid-19-evaluation-and-management-of-adults-following-acute-viral-illness#H1200905678>

Nature Editorial (October 7, 2020). Long COVID: let patients help define long-lasting COVID symptoms. Retrieved May 20 2021 from: <https://www.nature.com/articles/d41586-020-02796-2>

New South Wales (NSW) Government: COVID-19 Critical Intelligence Unit. (2020). Evidence Check: Rehabilitation needs of post-acute COVID-19 patients. Retrieved from: https://aci.health.nsw.gov.au/_data/assets/pdf_file/0006/581676/Evidence-Check-Rehabilitation-needs-of-post-acute-COVID-19-patients.pdf

Parkin, A., Davison, J., Tarrant, R., Ross, D., Halpin, S., Simms, A., ... & Sivan, M. (2021). A Multidisciplinary NHS COVID-19 Service to Manage Post-COVID-19 Syndrome in the Community. *Journal of Primary Care & Community Health*, 12, 21501327211010994.

Perego, E., Callard, F., Stras, L., Melville-Jóhannesson, B., Pope, R., & Alwan, N. A. (2020). Why the Patient-Made Term 'Long Covid' is needed. *Wellcome Open Research*, 5(224), 224.

Poenaru, S., Abdallah, S. J., Corrales-Medina, V., Cowan, J. (April 20th, 2021). COVID-19 and post-infectious myalgic encephalomyelitis/chronic fatigue syndrome: a review. *Therapeutic Advances in Infectious Diseases*. <https://doi.org/10.1177/20499361211009385>

Public Health Ontario (April 9th, 2021). Persistent Symptoms and Post-Acute COVID-19 in Adults – What We Know So Far. Retrieved May 10 2021 from: <https://www.publichealthontario.ca/-/media/documents/ncov/covid-wwksf/2020/07/what-we-know-covid-19-long-term-sequelae.pdf>

Radtke, T., Ulyte, A., Puhan, M. A., & Kriemler, S. (2021). Long-term symptoms after SARS-CoV-2 infection in school children: population-based cohort with 6-months follow-up. Short Report. *medRxiv*.

Royal Australian College of General Practitioners (n.d.). Caring for adult patients with post-COVID-19 conditions. Retrieved May 12 2021 from: <https://www.racgp.org.au/FSDEDEV/media/documents/RACGP/Coronavirus/Post-COVID-19-conditions.pdf>

SeyedAlinaghi, S., Afsahi, A. M., MohsseniPour, M., Behnezhad, F., Salehi, M. A., Barzegary, A., ... & Dadras, O. (2021). Late Complications of COVID-19; a Systematic Review of Current Evidence. *Archives of academic emergency medicine*, 9(1).

Shah, W., Hillman, T., Playford, E. D., & Hishmeh, L. (2021). Managing the long term effects of covid-19: summary of NICE, SIGN, and RCGP rapid guideline. *BMJ*, 372, n136. <https://doi.org/10.1136/bmj.n136>

Sisó-Almirall, A., Brito-Zerón, P., Ferrín, L. C., Kostov, B., Moreno, A. M., Mestres, J., ... Ramos-Casals, M. (2021). Long covid-19: Proposed primary care clinical guidelines for diagnosis and disease management. *International Journal of Environmental Research and Public Health*, 18(8).
<https://doi.org/10.3390/ijerph18084350>

Skyes, D. L., Holdsworth, L., Jawad, N., Gunasekera, P., Morice, A. H., Crooks, M. G. (February 11th, 2021). Post-COVID-19 Symptom Burden: What is Long-COVID and How Should We Manage It? Springer.
<https://doi.org/10.1007/s00408-021-00423-z>

Sudre CH, Murray B, Varsavsky T, Graham MS, Penhold RS, Bowyer RC et al. Attributes and predictors of Long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study App. MedRxiv (October 21 2020) <https://doi.org/10.1101/2020.10.19.20214494>

University College London, (n.d.). The Living With Covid Recovery Programme. Retrieved May 11 2021 from: https://www.ucl.ac.uk/healthcare-engineering/sites/healthcare-engineering/files/commissioner_information_-_1_page_-_living_with_covid_recovery_programme_pdf.pdf

Appendix A Symptom Sequelae

Box 1. COVID-19 specific significant sequelae^{1,4,7,8}

Pulmonary:

- Persisting interstitial lung disease
- Impaired lung function
- Pneumonia/lung cavitation
- Complications of intubation/ventilation

Cardiovascular:

- Myocardial infarction
- Myocarditis
- Pericarditis
- Arrhythmia
- Heart failure
- Venous thromboembolism (VTE)

Neurological:

- Stroke
- Cognitive impairment
- Encephalopathy
- Epilepsy
- Myelitis
- Critical care neuropathy/myopathy

Haematological:

- Hypercoagulable state
- Anaemia
- VTE

Rheumatological:

- Post-viral syndrome similar to chronic fatigue syndrome

Endocrine:

- Deterioration of diabetic control
- Osteoporosis due to prolonged immobilisation

Mental health:

- Worsening of cognitive decline
- Depression
- Anxiety
- Post-traumatic stress disorder (PTSD) following severe illness

Post-intensive care syndrome:

- Dyspnoea
- Anxiety
- Depression
- Prolonged pain
- Reduced physical function
- Reduced quality of life

General:

- Cardiac/respiratory/musculoskeletal deconditioning
- Renal impairment/acute kidney injury
- Liver dysfunction
- Malnutrition due to vomiting and diarrhoea/breathlessness/loss of appetite
- Pressure sores
- Skin rashes

Box 2. Post-acute COVID-19 symptoms^{1,3}

Common symptoms include:

- fatigue
- dyspnoea
- joint pain
- chest pain
- cough
- change in sense of smell or taste.

Less common symptoms include:

- insomnia
- low-grade fevers
- headaches
- neurocognitive difficulties
- myalgia and weakness
- gastrointestinal symptoms
- rash
- depression.

From: Caring for adult patients with post-COVID-19 conditions (Royal Australian College of General Practitioners, n.d.)

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Appendix B Symptom Management

Box 3. Management of common symptoms

Cough or breathlessness:^{1,9}

- Optimise management of pre-existing respiratory conditions
- Recommend respiratory muscle conditioning (pulmonary rehabilitation)
- Recommend gradual return to exercise guided by symptoms
- Consider home pulse oximetry measurement for reassurance
- Consider dietitian assistance if symptoms interfere with nutrition

Fatigue:^{1,4}

- Maximise self-care, sleep, relaxation and nutrition
- Recommend patients pace and apply prioritisation to daily activities
- Recommend caution with return to exercise (reduce if there is any increase in symptoms)
- A monitored return to exercise can be supported by physiotherapy or rehabilitation referral
- If fatigue is causing difficulty with activities of daily living (ADLs), energy conservation techniques and home visits to ensure patient safety can be provided by an occupational therapist or rehabilitation service

Chest pain:^{1,4,9}

- Exclude acute coronary syndrome, myocarditis, pericarditis and arrhythmia
- Manage with reassurance and education regarding symptoms of concern
- Patients who have had myocarditis or pericarditis as a component of their acute illness should have 3–6 months of rest from physical training and athletes should have cardiology supervision of return to training

Headaches, low-grade fevers, myalgia:¹

- Exclude COVID-19 reinfection or recrudescence
- Prescribe simple supportive measures and analgesia or antipyretics as needed
- Check for secondary infections and prescribe antibiotics as appropriate

Neurocognitive difficulty:^{1,4}

- Prescribe supportive management
- If severe enough to cause difficulty with ADLs, consider cognitive testing and occupational therapy support

Depression/anxiety:¹

- Provide information about post-COVID recovery
- Address multifactorial contributors that may require assistance with pain management, independence with ADLs, financial and other social supports and loneliness
- Consider options for supported access to mental health services or online support if patient is unwilling to access face-to-face counselling

Thrombosis risk and contraceptive choice:¹⁰

COVID-19 causes a hypercoagulable state in some people, which may worsen the VTE risk associated with combined hormonal contraception (CHC). The incidence of VTE in biological females of reproductive age with COVID-19 infection is currently not known.

- Patients should be advised of this risk to allow informed choice of contraceptive option
- Patients who have severe illness due to COVID-19 should cease their CHC and VTE prophylaxis should be considered
- The duration of risk is not yet ascertained, so consider recommending a progestogen-only or nonhormonal method of contraception for those who cease CHC
- It is reasonable to continue CHC in patients who have had asymptomatic or mild COVID-19 infection

From: Caring for adult patients with post-COVID-19 conditions (Royal Australian College of General Practitioners, n.d.)

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Symptom Specific Recommended Management

Post COVID Symptom	Considerations specific to COVID-19	Initial investigations to complete as part of clinical assessment and prior to referral	When to deviate from the pathway: Red Flags
Fatigue	- Very common post COVID - Consider impact of fatigue on role – e.g. caregiving, vocation, time off work and phased return. - Self-management advice in the LHTH Leeds Health Pathway COVID-19 patient rehabilitation booklet http://ftpbooks.leedsth.nhs.uk/LN_004864.pdf - Direct patient to NHS01 www.yourcovidrecovery.nhs.uk - Reassure that with time and self-management fatigue usually improves gradually - If no improvement after 3 months, worsening of symptoms or impacting significantly on life, refer to Community Based Services via SPUR	- Investigate modifiable contributors to fatigue, considering individual comorbidities and clinical assessment. Would usually include: - FBC, Fe, B12 and Folic Acid, U+E, TFTs, vitamin D, Ca - Assess and monitor fatigue using the Modified Fatigue Impact Scale (http://www.unlab.org/files/default/0files/0017-05/mfis.pdf) (cognitive and physical domains should be scored separately).	
Anxiety, depression and PTSD	- Common feature post COVID - Consider if fatigue/pain/sleep disturbance/cognition is also contributing or co-occurring. Online support: http://www.leedcommunityhealthcare.nhs.uk/our-services-a-z/leeds-mental-wellbeing-service/covid-19-support/ http://www.mindwell-leeds.org.uk/home/information-on-coronavirus/ - PTSD especially in ITU survivors – ask about intrusive thoughts, flashbacks, nightmares, avoiding reminders of the event/illness. Also excessive/obsessional cleaning/checking, fear of going out. - Concerns re PTSD and/or other mental health issues not improving refer to Leeds Mental Wellbeing Service. In context of significant fatigue and/or cognitive issues neuropsychological input will be required. Other resources: http://www.bps.org.uk/coronavirus-resource/ http://www.mind.org.uk/information-support/coronavirus/	- Consider a screening tool PHQ9 for depression or GAD7 for anxiety - Quality of life questionnaire - Work & Social Adjustment Scale (WSAS) - PTSD more likely in context of pre-morbid trauma - Mood impeding recovery/ causing protracted symptoms where physical examinations are normal. - Complex presentation i.e. contribution of several factors/ lack of progress despite physical recovery/ difficulties completing ADLs or work. Consider referral to CMHT or Leeds Mental Wellbeing Service - Systemic distress/ carer strain contributing to reactive distress/ relationship breakdown/ loss of support. Refer to Leeds Mental Wellbeing Service	- Suicidal ideation or immediate risk of harm to self or others refer to Mental health crisis team - Neurocognitive problems in the presence of a new or pre-existing neurological diagnosis; refer to Community Neurological Rehab Team

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Symptom Specific Recommended Management

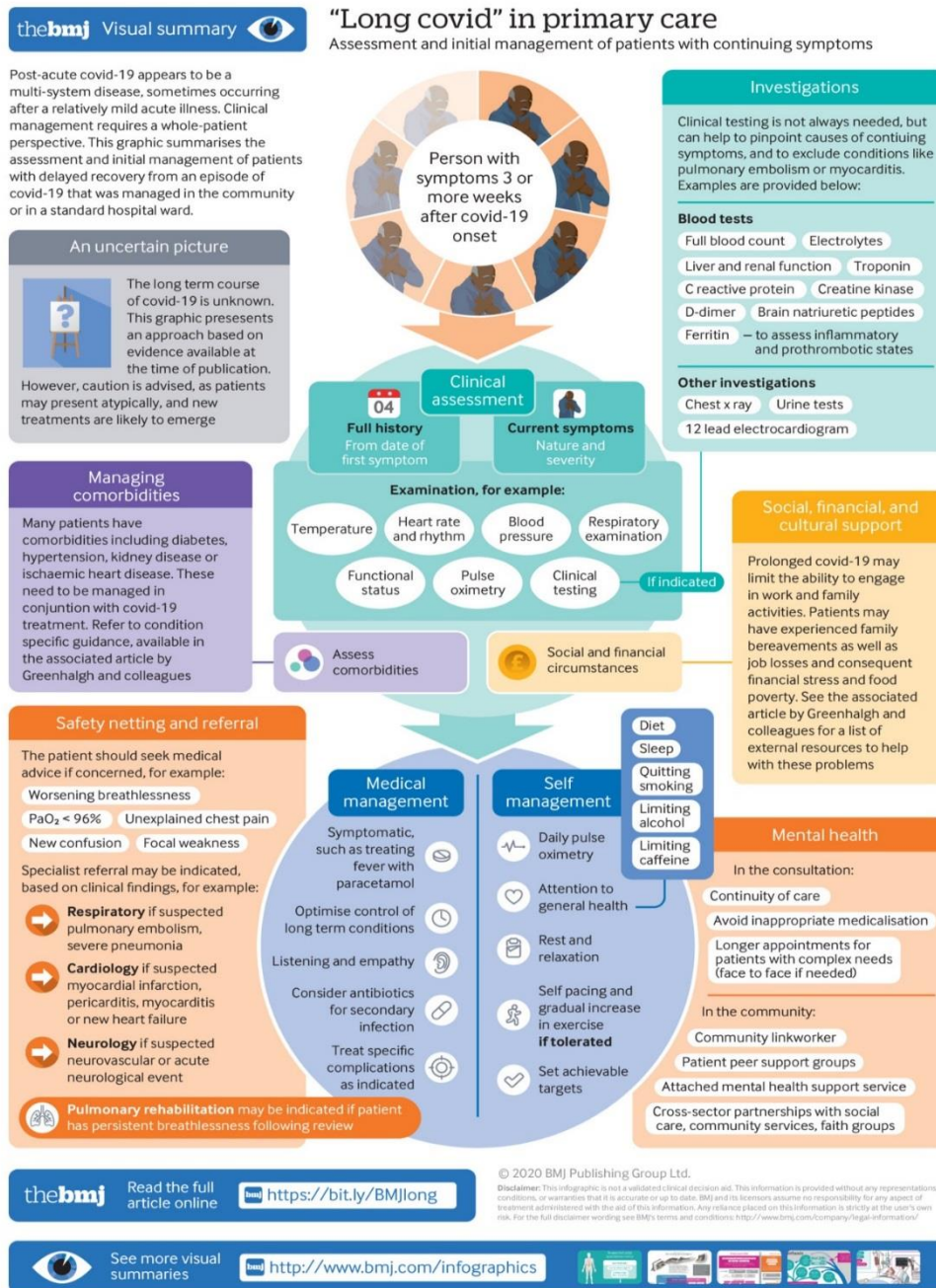
Post COVID Symptom	Considerations specific to COVID-19	Initial investigations to complete as part of clinical assessment and prior to referral	When to deviate from the pathway: Red Flags
Breathlessness	- Very common post COVID - Exertional breathlessness often persists for many weeks. Usual pattern is a gradual recovery. - Review at 3 months post Covid if not improving. - Unexplained crackles on auscultation refer for CXR. Depending on the results of this a HRCT scan may also be indicated. Chest X-ray appearances alone should not determine the need for further care. Be aware that a plain chest X-ray may not be sufficient to rule out lung disease - Consider increased risk of VTE / PE post-COVID - BNP normal result will exclude cardiac failure as a cause	- Bloods: FBC, U&E, LFT, Ca2+, TFT, BNP - Consider sputum sample if productive cough - ECG - CXR - O2 saturation at rest - SpO2- 92% - Oxygen desaturation on exercise – One minute sit to stand test (protocol attached) Results - If <4 weeks post-acute Covid-19 – and SpO2<92% or 4% drop from baseline – Acute assessment (PCAL) - If >4 weeks post-acute Covid-19 SpO2<92% or 4% drop from baseline – Refer to Community Respiratory Service for Ambulatory oxygen Assessment.	- Acute onset (<48 hours) severe SOB O2<92% (if new for the patient) - Resting Pulse>88bpm or >120bpm RR > 30 breaths/minute Refer PCAL for exclusion of Acute Pathology inc. PE. - Myocardial Ischaemia (chest pain) - Syncope/portugal dizziness - Heart failure - Shock (hypotension)
Cough	- Cough is a common symptom. - Dry cough likely to be post-viral and self-limiting though can persist for weeks as always remain hyper-sensitive.	- Consider sputum sample if productive cough - Treat with antibiotics according to current guidelines. If no improvement after 6 weeks request CXR. - Follow the Leeds Cough Pathway https://71633548c5290f9c8a76-11ea5e6ad12fc8f7bdc06a216b02560a-us-east1-jackobin.com/content/uploads/2020/06/Copy-of-GP-guidance-Chronic-Breathlessness-and-Cough-Assessment.pdf	- Haemoptysis - Unintentional weight loss night sweats - and/or a strong smoking history - urgent 2 week referral is appropriate
Chest pain	- Non-specific chest pain is common post Covid-19 Syndrome. It does not signify in the absence of other typical clinical features Oxygen saturation normal: PLUS normal chest x-ray: - Consider non-respiratory causes (e.g. infection or inflammation elsewhere). PLUS chest x-ray abnormal/showing consolidation: - Symptoms may be explained by pneumonia and assess and treat appropriately Typical pericardial pain (positional, inspiratory component) can be managed with analgesia +/-colchicine. Imaging is not usually helpful for uncomplicated cases Chest pain suggestive of myocardial ischaemia should be managed conventionally (RAACPC for stable exertional symptoms, urgent admission for possible ACS)	- Bloods: FBC, CRP - CXR - ECG - O2 sat	- Acute hypoxia, O2<92% (if new for the patient) - Acute severe breathlessness, - Pulse rate >120/min

https://71633548c5390f9d8a76-11ea5efadf29c8f7bdcc6a216b02560a.ssl.cf3.rackcdn.com/content/uploads/2021/03/20210315_COVID-19_Rehab_pathway.pdf; includes symptom specific care management guidelines.

From: NHS Primary Care Pathway, 2021; Based on BMJ paper on managing long term Covid <https://www.bmj.com/content/370/bmj.m3026>; Post-discharge and Rehabilitation needs in Survivors of Covid-19 Infection – Stephen Halpin et <https://onlinelibrary.wiley.com/doi/epdf/10.1002/imv.26368>; Management of post-acute covid-19 in primary care <https://www.bmj.com/content/370/bmj.m2808>

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Appendix C Primary Health Care Pathways



From: Management of post-acute covid-19 in primary care. BMJ. (Greenhalgh et al, 2020)

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Managing the Long Term Effects of Covid-19 - Guidance for Primary Care

1. Post-COVID patient presents to GP with ongoing symptoms

Stratification of patients presenting includes:

- Acute COVID-19: signs and symptoms of COVID-19 for up to 4 weeks.
- Ongoing symptomatic COVID-19: signs and symptoms of COVID-19 from 4 to 12 weeks.
- Post-COVID-19 syndrome: 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.

2. GP consultation:

History and examination. Investigations in primary care, as required based on symptoms – Management of post-acute covid-19 in primary care <https://www.guidelines.co.uk/infection/nice-long-covid-guideline/55728.article>
Symptom Specific Recommended Management-see Table below

3. GP supports self-management of common symptoms

Provides the LHT Leeds Health Pathway COVID-19 patient Rehabilitation Booklet <http://ltpbooks.leedsth.nhs.uk/LN004864.pdf> and direct to the NHSE Post Covid-19 Online Support Tool:

- www.yourcovidrecovery.nhs.uk

If patient experiencing Anxiety, depression, OCD, PTSD make self- or clinician- referral to Leeds Mental Wellbeing Service <https://www.leedsth.nhs.uk/our-services-a-z/leeds-mental-wellbeing-service/covid-19-support/>

4. Symptoms improve

5. Care remains in Primary Care

6. Symptoms do not improve and are significantly impacting on life:

Refer to SPUR using the referral form (attached).

- At referral to the Post-Covid 19 Rehab Pathway patients would usually be expected to be 12+ weeks from initial COVID infection. Earlier than this many will improve with the above measures.
- Positive PCR or Ab tests are not essential but would usually be expected to substantiate the history of COVID infection after the first wave (March-April 2020) when testing was not widely available.
- Symptom based investigations. Must be completed or in process at the point of referral (see table below).

7. SPUR will triage and send to appropriate service.

- For MDT rehabilitation of severely impacting Post-Covid-19 symptoms this will be the Community Covid Rehabilitation team. GP can also discuss this referral directly with SPUR or with Post Covid-19 Pathway Coordinator 0113 8433496 or email LCHT.Covid19rehabpathway@nhs.net
- For patients with breathlessness requiring ambulatory oxygen assessment post Covid-19 (including those with COPD/PPF) this will be through the Community Respiratory Team. They can be contacted for further advice (Mon-Fri 8.30-16.30) on 0113 8434290

8. Access to virtual Covid Rehabilitation MDT, including input from cardiology, respiratory medicine and rehabilitation medicine, to support recovery

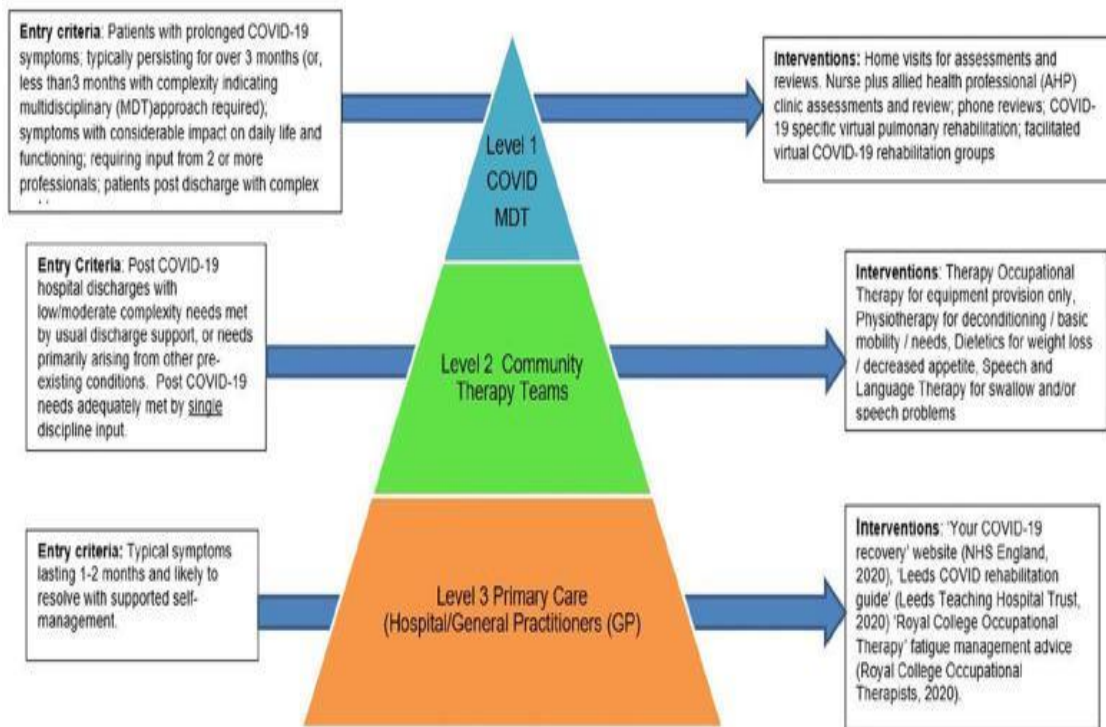
Version 1.0
created
13 March 2021
Review Date
March 2022

https://71633548c5390f9d8a76-11ea5efadf29c8f7bdcc6a216b02560a.ssl.cf3.rackcdn.com/content/uploads/2021/03/20210315_COVID-19_Rehab_pathway.pdf; includes symptom specific care management guidelines.

From: NHS Primary Care Pathway, Doncaster 2020; BMJ paper on managing long term Covid <https://www.bmj.com/content/370/bmj.m3026>; Post-discharge and Rehabilitation needs in Survivors of Covid-19 Infection – Stephen Halpin et <https://onlinelibrary.wiley.com/doi/epdf/10.1002/jmv.26368>; Management of post-acute covid-19 in primary care <https://www.bmj.com/content/370/bmj.m2808>

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.

Appendix D Specialty, Multidisciplinary Care Pathways and COVID Clinics



From: A Multidisciplinary NHS COVID-19 Service to Manage Post-COVID-19 Syndrome in the Community. Journal of Primary Care and Community Health. (Parkin et al 2021)



(Ladds et al. 2021)

Disclaimer: Due to the rapidly emerging evidence around COVID-19, key messages and summaries included in our rapid synthesis have been retrieved from diverse sources including systematic reviews, commentaries, rapid reviews, credible and trustworthy websites (JAMA, WHO, CDC, IPAC, BMJ, CMAJ), and credible media sites. The information in the document reflects what is known as of May 26, 2021, and may change as new information becomes available. Rapid reviews are intended for planning purposes and are not to be used as guidance or policy direction.