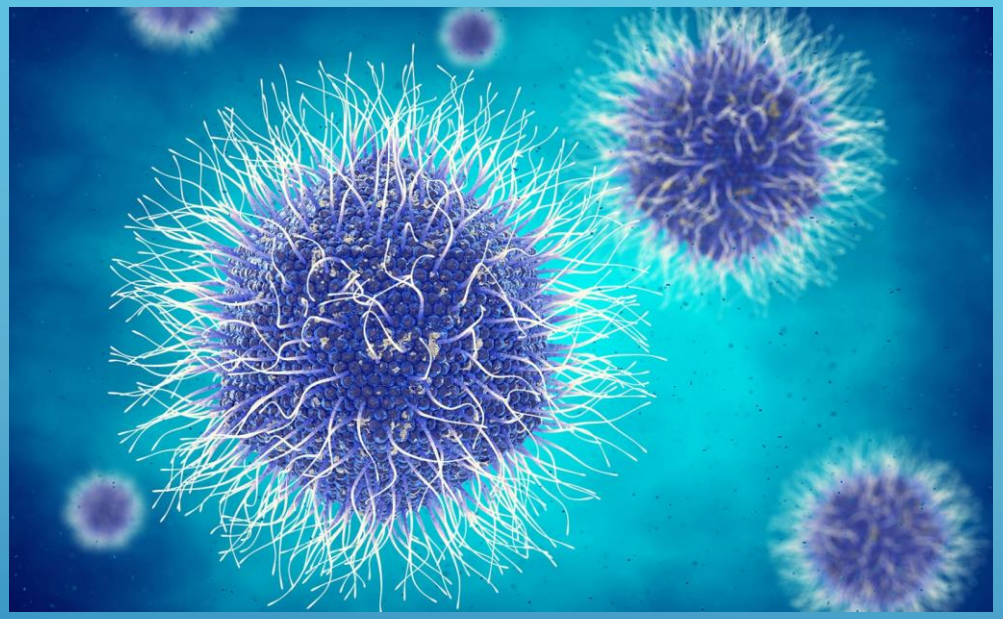
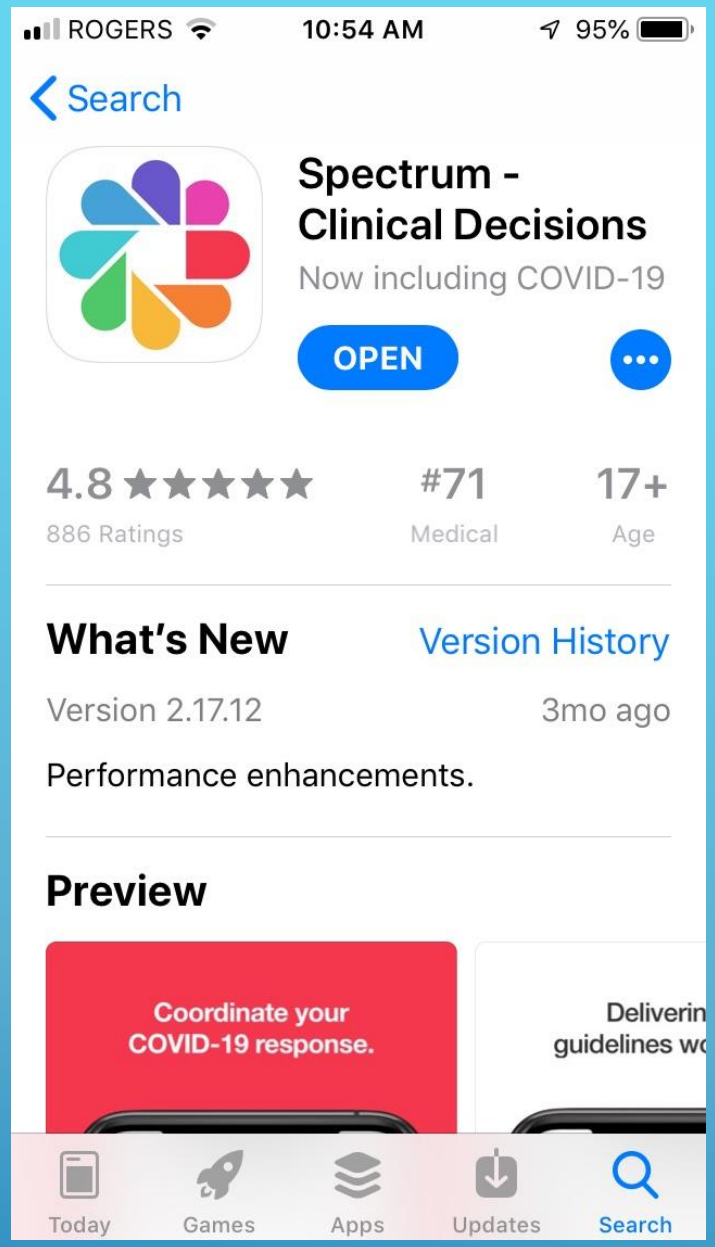
POST-COVID-19 RECOVERY, REHABILITATION, & PERSISTENT COVID-19 SYMPTOMS



Dr. Jill Calder

Physical Medicine & Rehabilitation

Royal Inland Hospital



CONFLICTS OF INTEREST

None to declare

Rehabilitation contribution to the SPECTRUM app – both the app and the contribution are without compensation or conflict

https://www.interiorhealth.ca/YourEnvironment/CommunicableDiseaseControl/covid19/IH-PH-COV-506%20COVID-19%20Guide%20to%20Home-Based%20Health%20and%20Wellness.pdf

OBJECTIVES / OUTLINE:

Describe COVID-19 presentations in the acute, post-acute and persistent/chronic phases.

Develop an approach to the recognition, evaluation, and management of post-COVID-19 sequelae.

- Pulmonary function
- Cardiac function
- Vascular function
- Central nervous function
- Peripheral nervous function
- Musculoskeletal function
- Gastrointestinal function
- Fatigue

  (Myalgia Encephalomyelitis /Chronic Fatigue Syndrome)
- Psychologic function
- Psychiatric

LESSONS LEARNED FROM PATIENTS AND EPIDEMIC AND NOVEL VIRUSES

Polio (1910)
Spanish Flu (1918)
HIV (1969, 1981)
Sars-Cov-2 (2002)
Swine/ H1N1 (2009)
MERS 2012

Fear
At risk populations
Population spread
Continental leaps

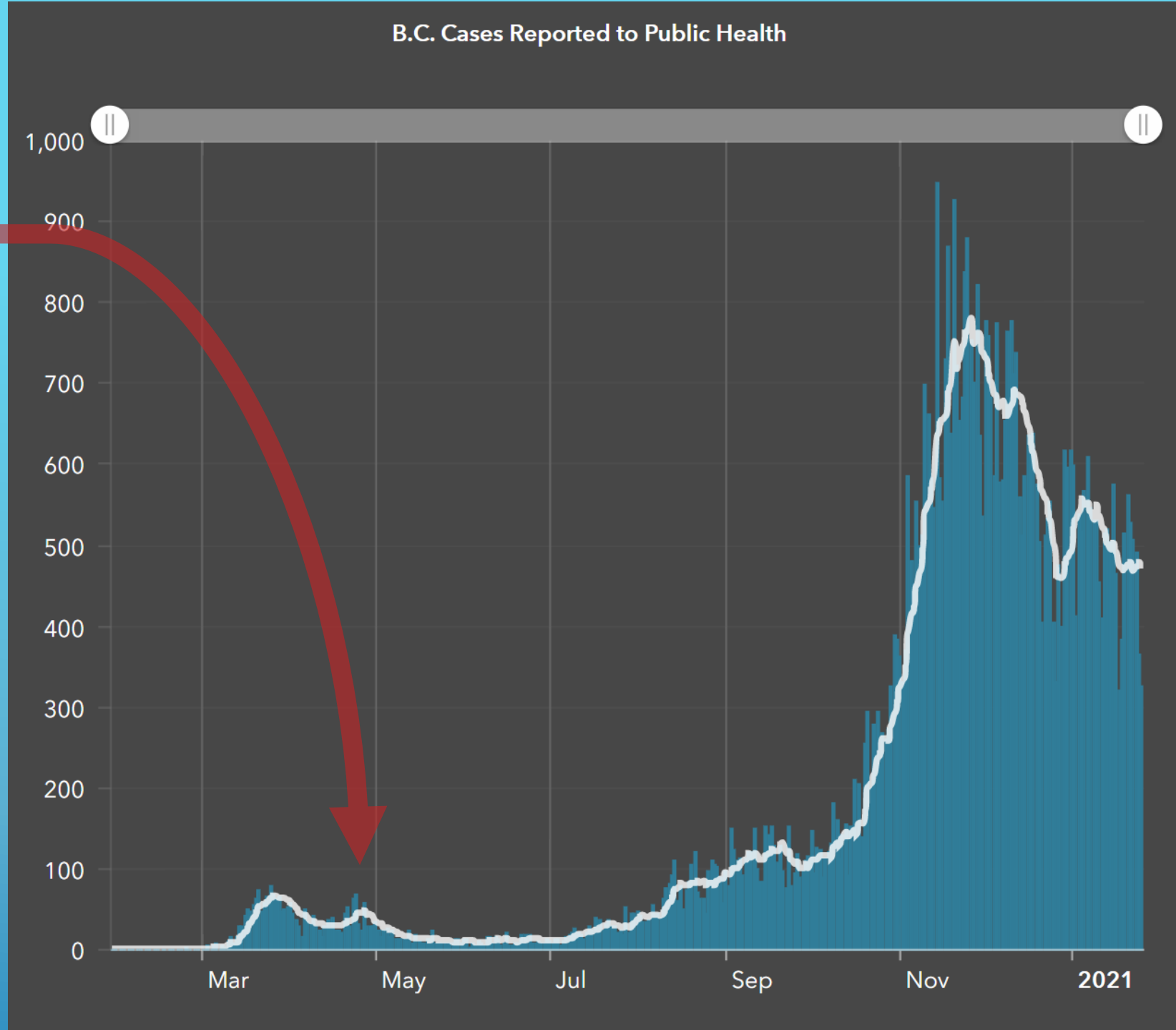
Some known knowns
Some known unknowns
Unknown unknowns

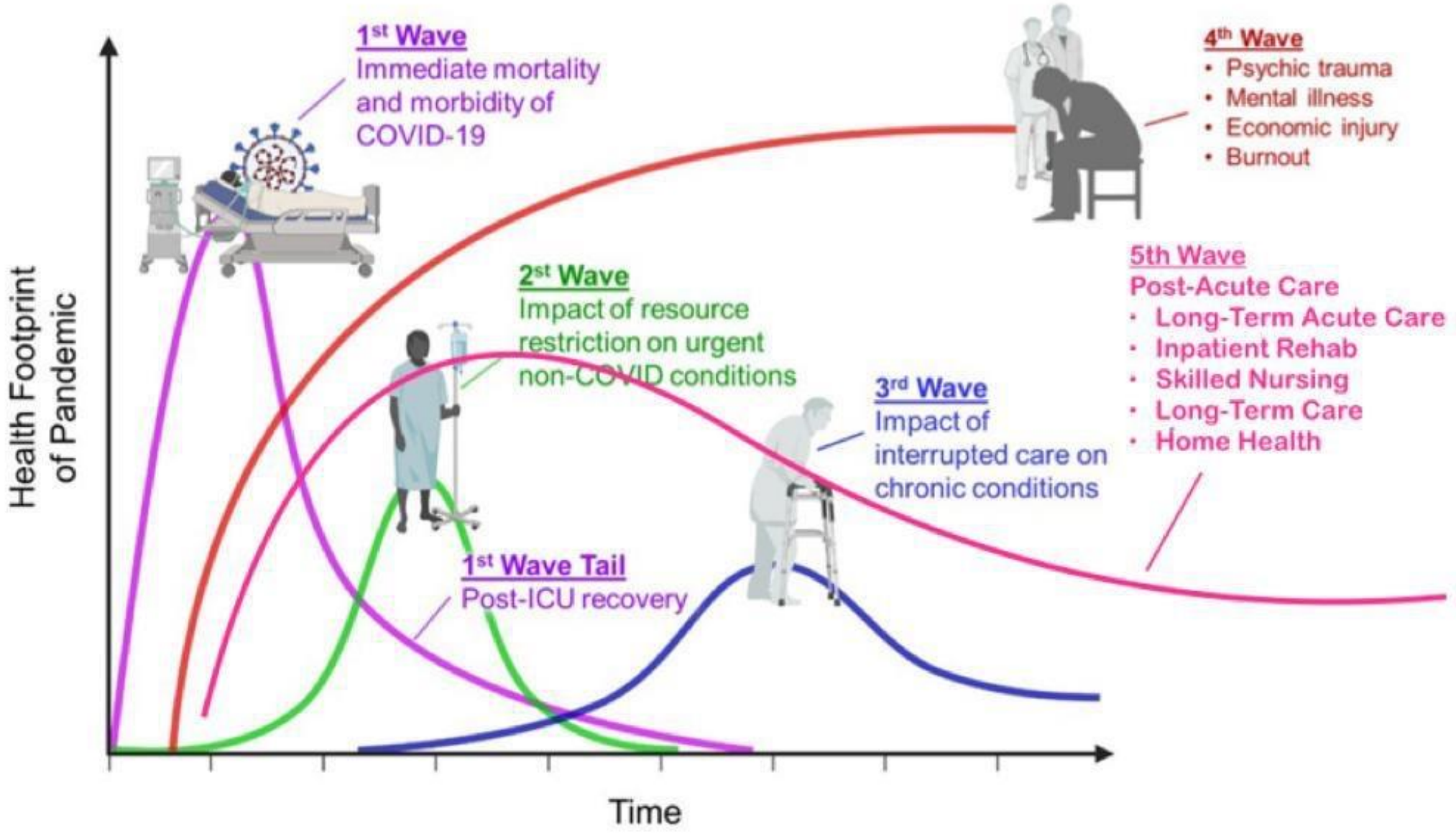

PRINTING
INFLUENZA
WEAR
MASK
LIBERTY

Presentation: Post-Acute COVID-19 Recovery and Rehabilitation
April 28, 2020

Dr. Natalja Tchajkova
Dr. Jaspreet Kambo
Dr. Jill Calder

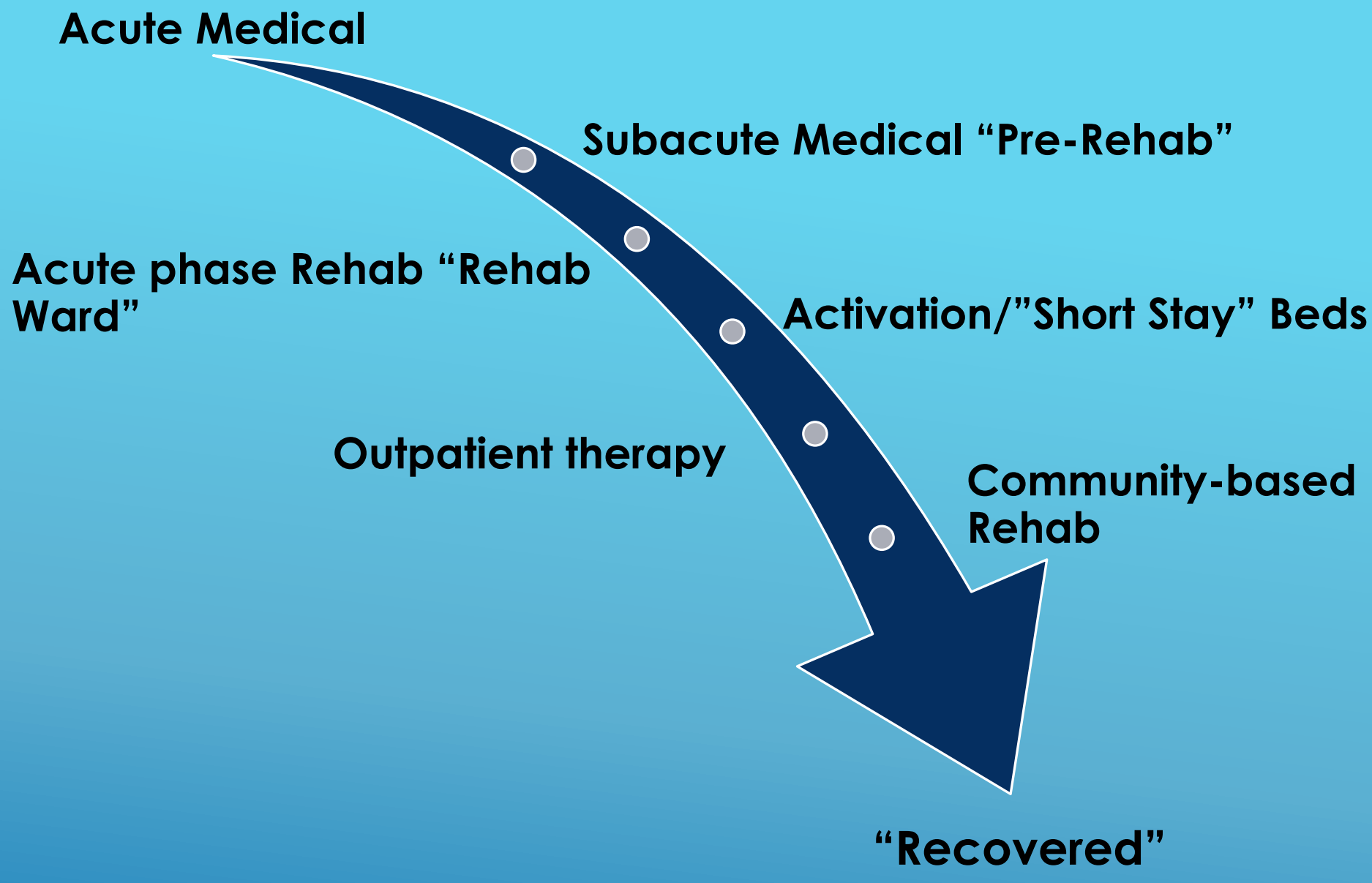
Audio:
http://insidenet.interiorhealth.ca/Clinical/CDunit/CDdocuments/Grand%20Rounds%20-%20Audio%20for%20COVID-19%20Recovery%20and%20Rehabilitation.aspx
PPT:
https://www.interiorhealth.ca/YourEnvironment/CommunicableDiseaseControl/covid19/PPT%20-%20Post-Acute%20COVID-19%20Recovery%20and%20Rehabilitation_28April2020.pdf





Source: Twitter, Dr. Victor Tseng 2020, modified by Dr. Brian McMichael 2020.

Typical Rehabilitation Services access and flow:

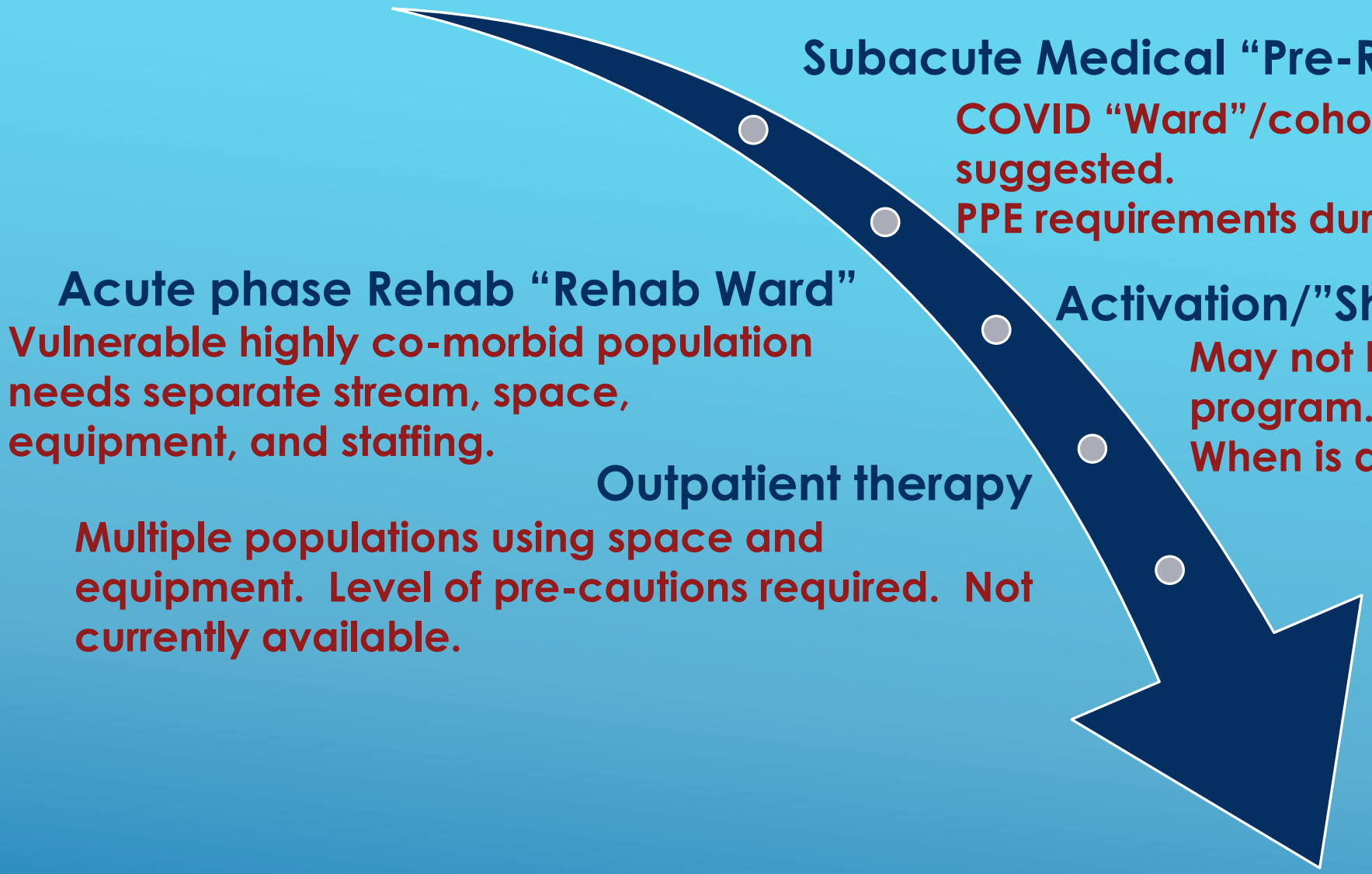


Rehab should be part of COVID-19 response team
Integration, Coordination

Acute Medical

Recommendations for optimal patient care

1. EMTs are encouraged to fully integrate rehabilitation personnel into the multidisciplinary team and ensure that they participate in daily ward rounds and other consultations.
2. Rehabilitation personnel should be involved in deciding on the referral or discharge of any patient with significant functional limitations and on follow-up requirements.
3. Pre-deployment training should emphasize multidisciplinary practice and patient-centred care.



Subacute Medical "Pre-Rehab"

COVID "Ward"/cohort - specialized team suggested.
PPE requirements during rehab activation.

Acute phase Rehab "Rehab Ward"

Vulnerable highly co-morbid population needs separate stream, space, equipment, and staffing.

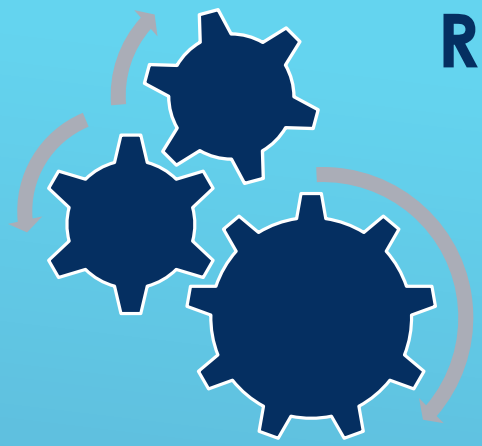
Activation/"Short Stay" ward

May not be able to fast track to usual program.
When is a patient clear of COVID?

Outpatient therapy

Multiple populations using space and equipment. Level of pre-cautions required. Not currently available.

Key points from the April 28, 2020 talk:



We need to be ready

Ready to be flexible

Ready to re-tool equipment and spaces

Ready to cohort populations

Ready to re-allocate staff

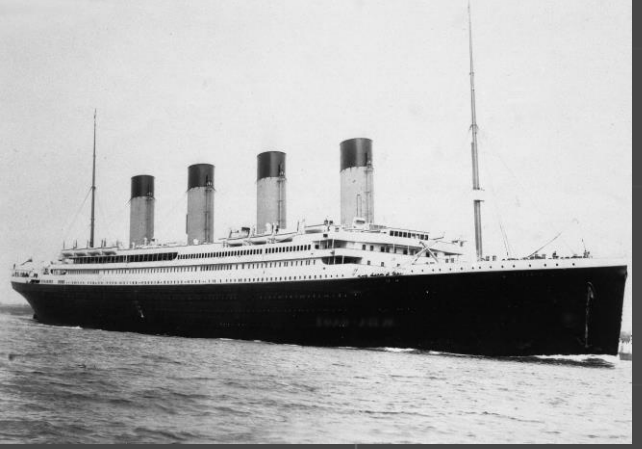
Ready new innovations in care

Yet preserve existing care

Key points:

- novel, un-precedented, unpredictable
- majority of cases survive
- not just a pulmonary disease
- luxury of time and connections around the world
- we are innovating on a fast track to beat the second wave

Correction-the 2nd wave is here!



CASES BELOW THE WATER LINE:

Those who sought testing are the “tip of the iceberg” of those who actually had a mild case.

Suspect incomplete recovery is likely without some support and re-activation curriculum available to them.

Further study needed on those who stayed home – may need augmentation to community based activation programs to recover fully.

Need for Telehealth outreach and online resources.

ORTHOEVIDENCE+
www.myorthoevidence.com

OEINSIGHTS+
Evidence, Analytics, Decisions

Long-Term Health Impact of COVID-19: Emerging Updates

August 22, 2020 | Article No. 16

Contributors

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Editor-in-Chief, OrthoEvidence

Insights

- Recovering from COVID-19 does not bring an end to the health impact of the disease.
- There is emerging evidence and hypotheses regarding the long-term sequelae of COVID-19.

British Columbia

Doubted and dismissed: COVID-19 'long-haulers' share their experiences

B.C. Ministry of Health says it's adapting its response as health officials learn more about the virus

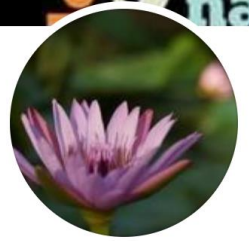
Maryse Zeidler · CBC News · Posted: Sep 20, 2020 6:00 AM PT | Last Updated: September 20

Jonah McGarva says he still experiences at least a dozen symptoms related to COVID-19, months after he first started feeling ill. (Ben Nelms/CBC)

Group by Susie Goulding

COVID Long-Haulers Support Group Canada

Private group · 11.7K members



Covid-19 Long-Haulers

@covid19longhaulers · Health & Wellness Website

Send Message

Volume:4 Issue:1 Number:3 ISSN#:2563-559X

OE Original

COVID-19: Long-Lasting Health Effects Among Survivors

Authored By: OrthoEvidence

January 25, 2021

< Previous

How to Cite

OrthoEvidence. COVID-19: Long-Lasting Health Effects Among Survivors. OE Original. 2021;4(1):3. Available from: https://myorthoevidene.com/Blog/Show/112

COVID-19: Long-Lasting Health Effects Among Survivors (myorthoevidence.com)

RECENT LITERATURE POST-COVID-19 SYMPTOMS

August 11, 2020 n=143, Italian study.

87.4% persistent symptoms

60% three or more symptoms

44.1% worsened quality of life.

Carfì, A., et al. (2020). Persistent Symptoms in Patients After Acute COVID-19. *JAMA*, *324*(6), 603-605. doi:10.1001/jama.2020.12603

August 23, 2020 n=55

30.91% Gastrointestinal symptoms

18.18% Headache

16.36% Fatigue

14.55% Exertional dyspnea

1.81% Cough/sputum

74.55% Lung CT changes

25.45% DLCO abnormal

D-dimer marker?

Zhao, Y. M., et al. (2020). Follow-up study of the pulmonary function and related physiological characteristics of COVID-19 survivors three months after recovery. *EClinicalMedicine*, *25*, 100463. doi:10.1016/j.eclinm.2020.100463

RECENT LITERATURE POST-COVID-19 / CONTINUED

October 17, 2020 n=51 Chest CT changes from acute phase to after discharge phase

Ground glass	17.7%	to	9.8%
Opacities	80.4%		23.5%
Consolidation	49%		2%
Septal thickening	80.4%		23.5%

Liu, C., et al. (2020). Chest Computed Tomography and Clinical Follow-Up of Discharged Patients with COVID-19 in Wenzhou City, Zhejiang, China. *Ann Am Thorac Soc*, *17*(10), 1231-1237. doi:10.1513/AnnalsATS.202004-324OC

November 1, 2020 n=100, German study. Cardiac MRI at 64-92 days.

- **78% abnormal regardless of severity of COVID-19 presentation**
- **60% myocardial inflammation**
- **32% pericardial enhancement**

Puntmann, V. O., et al. (2020). Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol*, *5*(11), 1265-1273. doi:10.1001/jamacardio.2020.3557

RECENT LITERATURE POST-COVID-19 / CONTINUED

Jan 1, 2021 n=26, Cardiac MRI, competitive college athletes, asymptomatic to mild infection, no hospitalization, no therapy required.

- **15% myocarditis**
- **30% late enhancement -prior myocardial injury**

Rajpal, S., et al. (2021). Cardiovascular Magnetic Resonance Findings in Competitive Athletes Recovering From COVID-19 Infection. *JAMA Cardiol*, *6*(1), 116-118. doi:10.1001/jamacardio.2020.4916

Jan 1, 2021 n=538, 3 months post discharge.

- **49.6% fatigue, sweating, myalgia, arthralgia, chills, limb edema, dizziness.**
- **39% respiratory symptoms**
- **28.6% alopecia**
- **22.7% psychosocial symptoms**
- **13% cardiovascular symptoms**

Xiong, Q., et al. (2021). Clinical sequelae of COVID-19 survivors in Wuhan, China: a single-centre longitudinal study. *Clinical Microbiology and Infection*, *27*(1), 89-95. doi:10.1016/j.cmi.2020.09.023

RECENT LITERATURE POST-COVID-19 / CONTINUED

Jan 16, 2021 n=1733 6 month follow-up.

- 76% had one persistent symptom
- 63% fatigue or muscle weakness
- 26% sleep disturbance
- 27% pain and discomfort
- 23% depression/anxiety
- 22% hair loss
- 11% smell disorder
- 7% mobility impaired
- 2% activity limited
- 1% impaired in very basic ADLs

Stratified by high acute severity

- 3 times more likely to endure muscle weakness/fatigue
- 2 times more likely to suffer depression or anxiety.

Huang, C., et al. (2021). 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *The Lancet*, *397*(10270), 220-232. doi:10.1016/S0140-6736(20)32656-8

CAUTION ON THE LITERATURE TO DATE:

BEWARE:

Small numbers

Short time intervals

Subjective symptoms hard to measure

Patient self reports

Gets better as time goes by

FUTURE DIRECTIONS:

Huang et al acuity markers to predict those most likely to need follow-up

Objective scoring systems, scales, and physical measures

SURVIVOR CORPS

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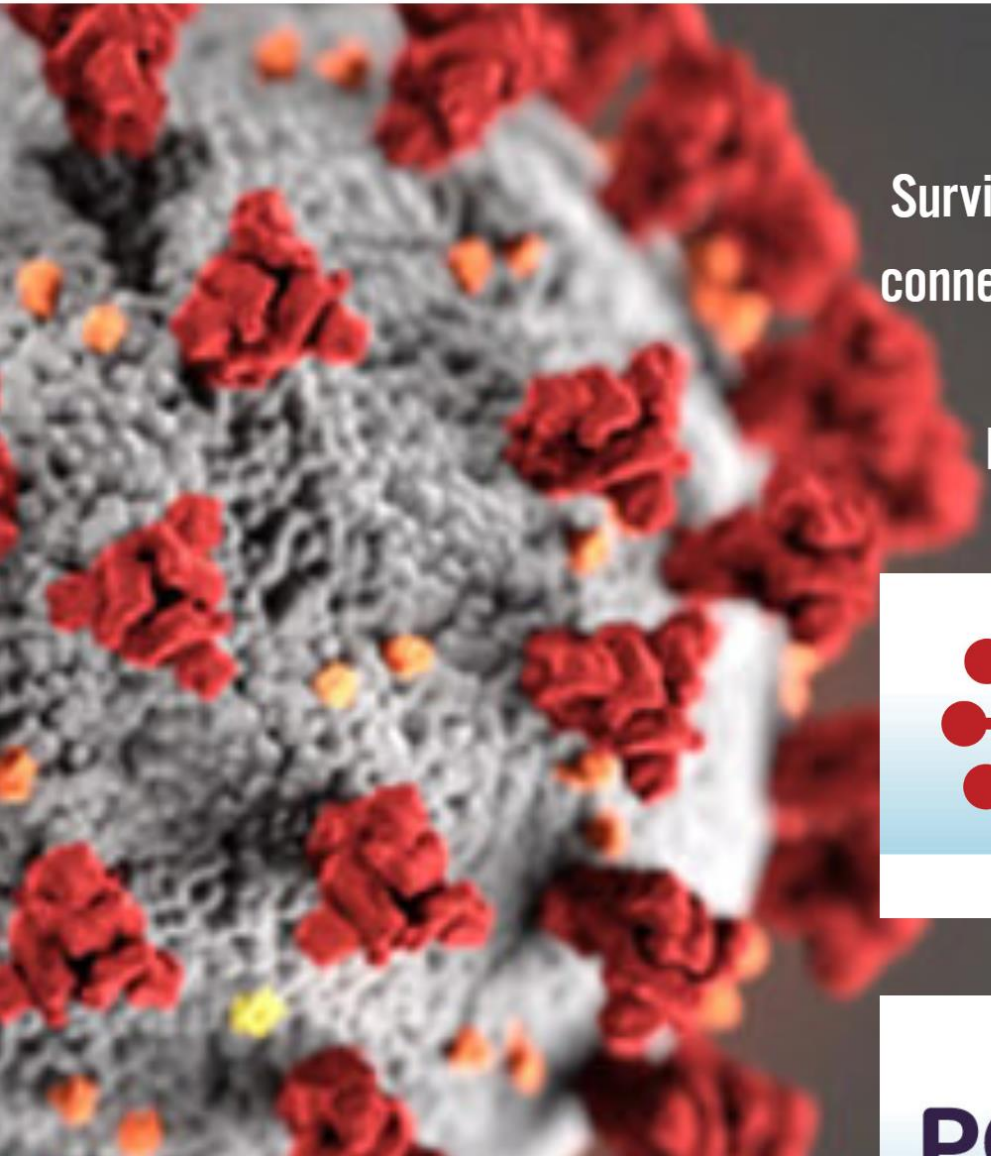
SC News Contact

Donate $

https://www.survivorcorps.com/



Survivor Corps is one of the largest and fastest growing grassroots movements connecting, supporting, educating, motivating and mobilizing COVID-19 Survivors to support all medical, scientific and academic research, help stem the tide of this pandemic and assist in the national recovery.

About

Take Action

Events Calendar

Surveys & Reports

PCCC

Figure 2. The 50 Most Common Long Hauler Symptoms

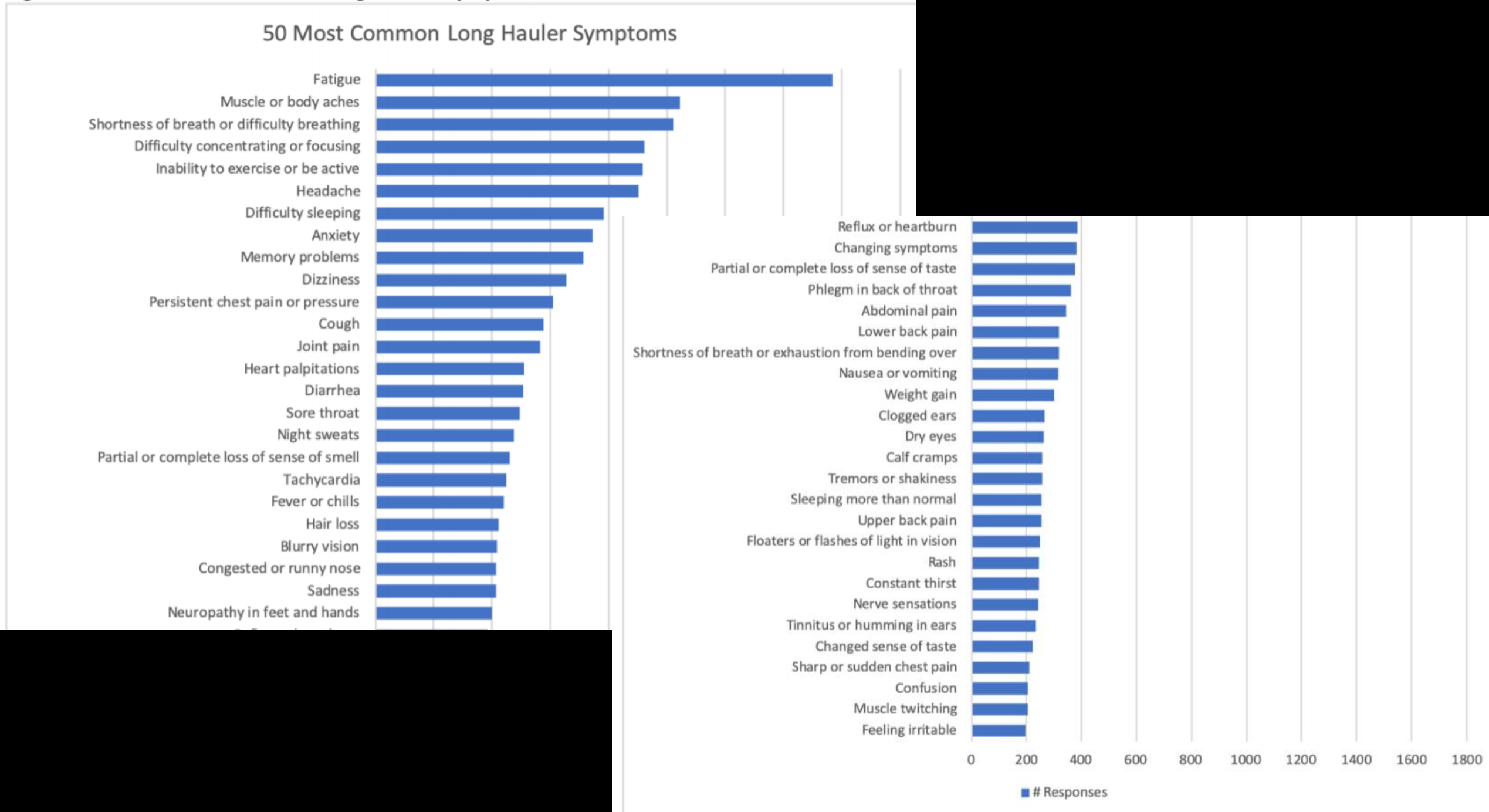
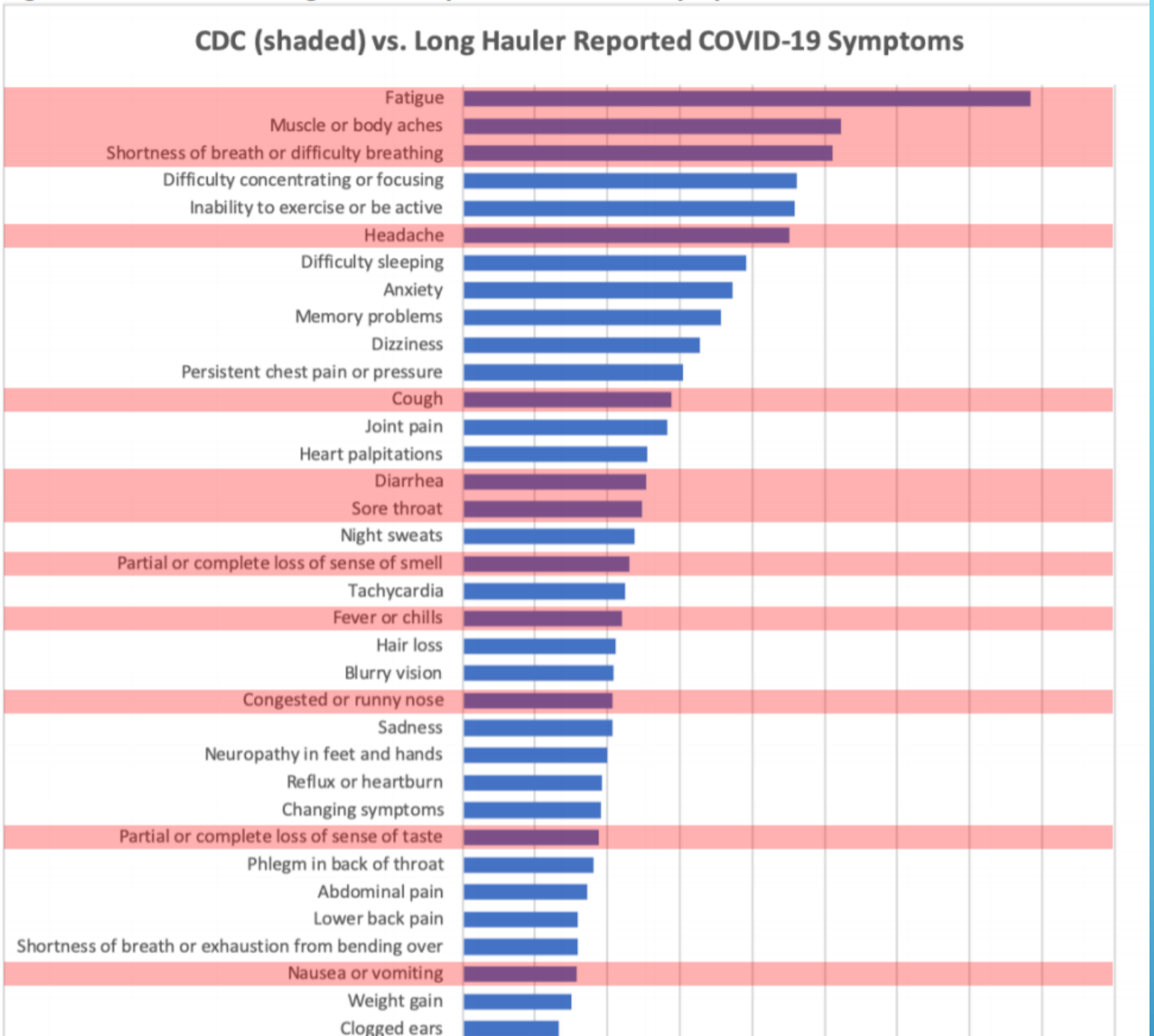


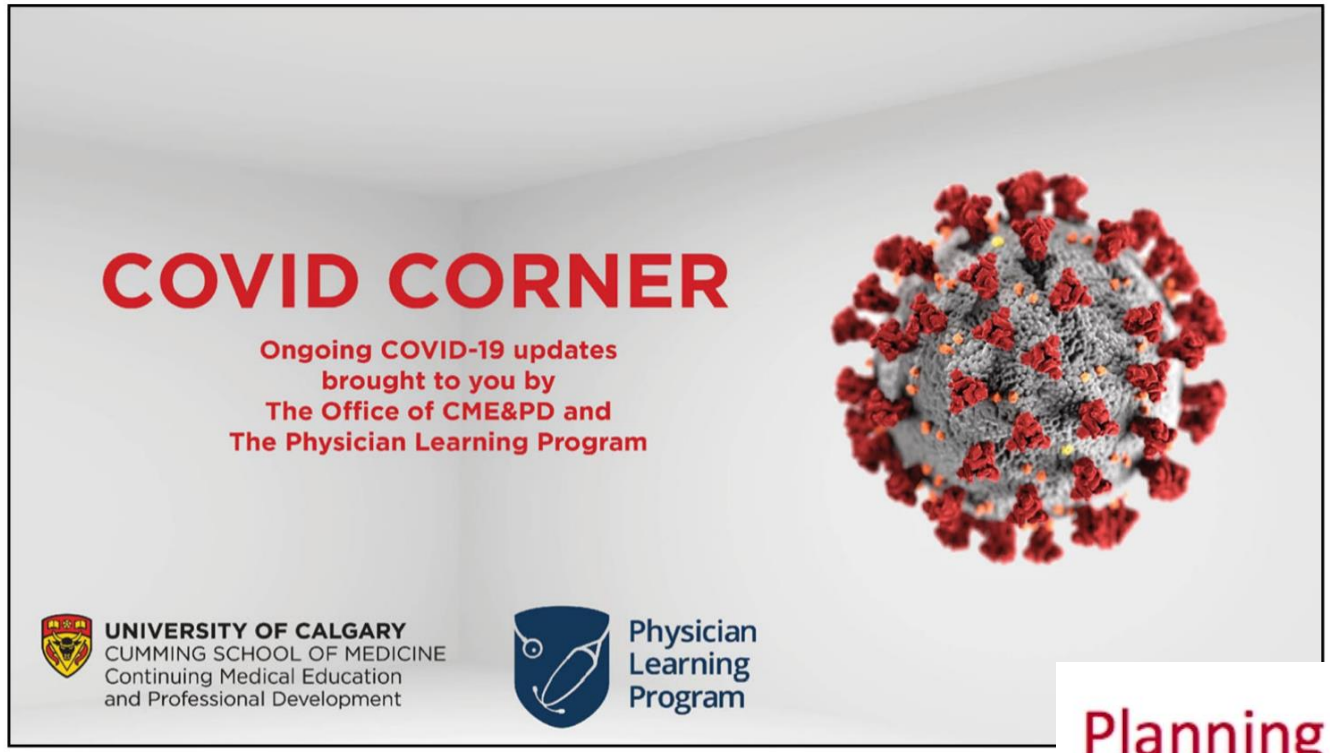
Figure 4. CDC Verses Long Hauler Reported COVID-19 Symptoms



Other COVID sequelae tracking:

https://www.bma.org.uk/media/3070/bma-covid-tracker-survey-full-results-aug-2020.pdf

CDC. (2020, Nov 13, 2020). Long-Term Effects of COVID-19. https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects.html



1

https://ecme.ucalgary.ca/covid-19-cme-resources/covid-corner/

Planning Committee

Physician Learning Program

UNIVERSITY OF CALGARY

Kelly Burak FRCPC MSc (CHAIR)
Heather Armson MD MCE CCFP FCFP
David Topps MB ChB CCFP
Katrina Nicholson MD ChB CCFP
Shawn Dowling MD FRCPC
Douglas Woodhouse MD BScEng CCFP
Michelle Bailey MSc MD FRCSC
Selena Au MD FRCPC
Jackie Thurston MD FRCSC
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Alanna Wall MA
Susan Limongiello MBA
Dana Young BA Hons

https://ubccpd.ca/course/covid19-webinar-jan-28-2021

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COVID-19 | Family Medicine | Webinar

The Journey to Recovery - Post-COVID-19 Care in BC

COVID-19 Webinar Series

1.5 Mainpro+

1.5 MOC Section 1

Accreditation

Target Audience:
Physicians and other health care providers.

Course Format: Online webinar 1830-2000 PST: presentations with Q&A

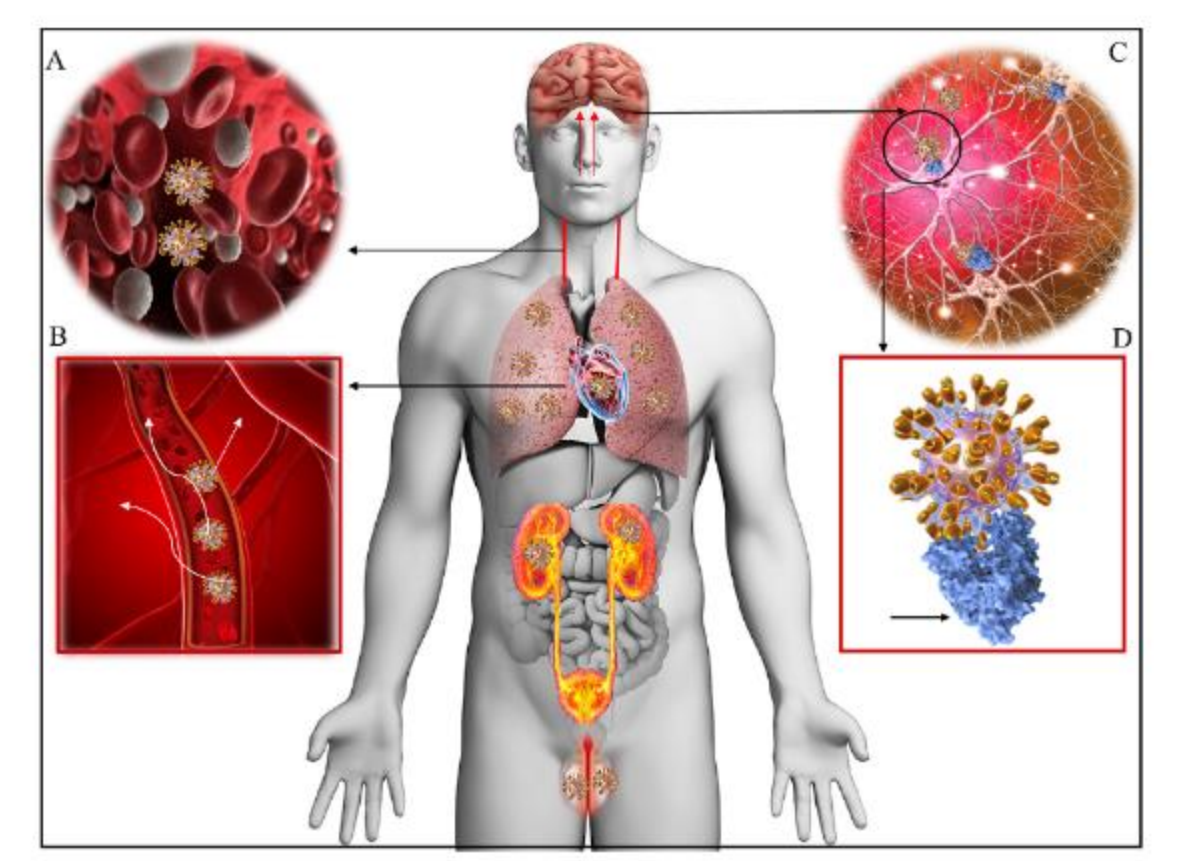
Jan 28, 2021

Add to calendar +

Broadcast starts: 6:30 PM PST

Online from Vancouver BC

SEQUELAE – THEORIES SUPPORTIVE TREATMENT, SOME THERAPIES EMERGING



ACE2 receptors neurotropism? – direct invasion

Increased inflammatory response?

Cytokine storm?

S1 protein receptor for CNS entry?

ACS Chem Neurosci. 2020 Apr 1;11(7):995-998. doi: 10.1021/acschemneuro.0c00122. Epub 2020 Mar 13.Evidence of the COVID-19 Virus Targeting the CNS: Tissue Distribution, Host-Virus Interaction, and Proposed Neurotropic Mechanisms.
Baig AM1, Khaleeq A1, Ali U2, Syeda H3.

"OUR IGNORANCE IS PROFOUND" DR. KRUMHOLZ
ACUTE PHASE = A MULTISYSTEM ATTACK?

Pulmonary – 3-67% ARDs*, milder resp symptoms majority

Cardio, vascular – inflammation. MI, CHF, myocarditis – 8-33%

Neurological – 30-84% admitted

- CNS – strokes ischemic + hemorrhagic – 5%-23%
- PNS – Loss of smell and taste - 40-70%
- Neuromuscular – myalgia 40%
- ICU related – PICS, weakness – 70-80%+ prolonged admission (±21 days)

Hyper-coagulation – 30-80%

Fatigue – 44%+

Neurocognitive – 36-80%

Psychiatric –depression anxiety, PTSD - 48%+

Renal – catabolic, AKI, dialysis

Other – GI, dermatology, hepatology, endocrine

N Engl J Med. 2020 Apr 15. Neurologic Features in Severe SARS-CoV-2 Infection. Strasbourg, France. Julie Helms, M.D., Ph.D. Stephane Kremer, M.D., Ph.D.

PULMONARY ACUTE-SUBACUTE-PERSISTENT . . .

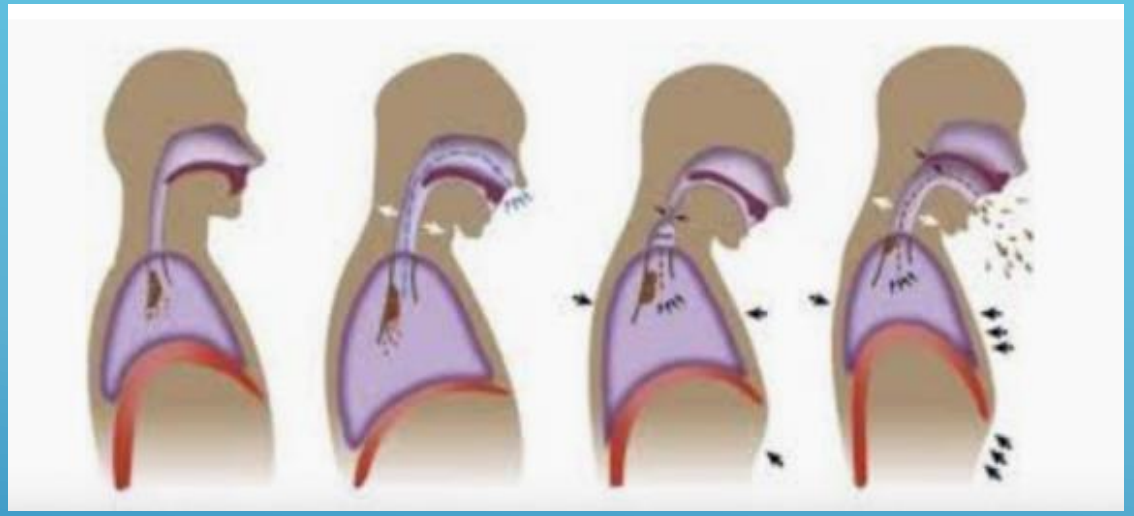
Acute Critical Phase (ICU)

- Ventilation support/ weaning
- Reduction of dyspnea, airway clearance*
- Positional therapy
- WHO advises early activation, fatigue level (Carda et al, 2020)
- PT – proning, sit, dangle, mobilize, clearance
- OT – delirium, early ADLs, seating
- SLP – dysphagia, communication

McMaster University

Rehabilitation for Patients with COVID-19
Guidance for Occupational Therapists, Physical Therapists, Speech-Language Pathologists, and Assistants

School of Rehabilitation Science



PULMONARY ACUTE-SUBACUTE-PERSISTENT . . .

Acute Ward (out of ICU or not needing it)

- Mobilize (get out of bed)
- Therapeutic postures
- Limb exercises
- Neuromuscular electrical stim*
- Respiratory muscle training
- Bronchial clearance closed circuits
- OT – ADLS, cognitive, coping, mobilize
- SLP – dysphagia, cognitive
- RT – trach, respiratory
- Discharge planning team

McMaster University

Rehabilitation for Patients with COVID-19
Guidance for Occupational Therapists, Physical Therapists, Speech-Language Pathologists, and Assistants

School of Rehabilitation Science

PULMONARY ACUTE-SUBACUTE-PERSISTENT . . .

Post-Acute (Intermediate rehab location)

Depends on degree of pre- and post- comorbidities, recovery sequence

Trach weaning + phonation, secretions

Mobilize muscle strength

Specific mobility aides

Respiratory muscle training

PT, OT, SLP, RT, discharge team

Tele-follow ups

Community* and home program

PERSISTENT PULMONARY SYMPTOMS

Emerging data indicate persistent symptoms months after treatment

87% of hospital patients have persistent lung symptoms

PRESENTATION: wide range of lung disease

Chronic cough, dyspnea, fatigue.

Fibrotic lung disease, bronchiectasis, and pulmonary vascular disease

Evidence = acute presentation, and extrapolations from the 2003 outbreak of severe acute respirator syndrome (SARS) and data on acute respiratory distress syndrome (ARDS)

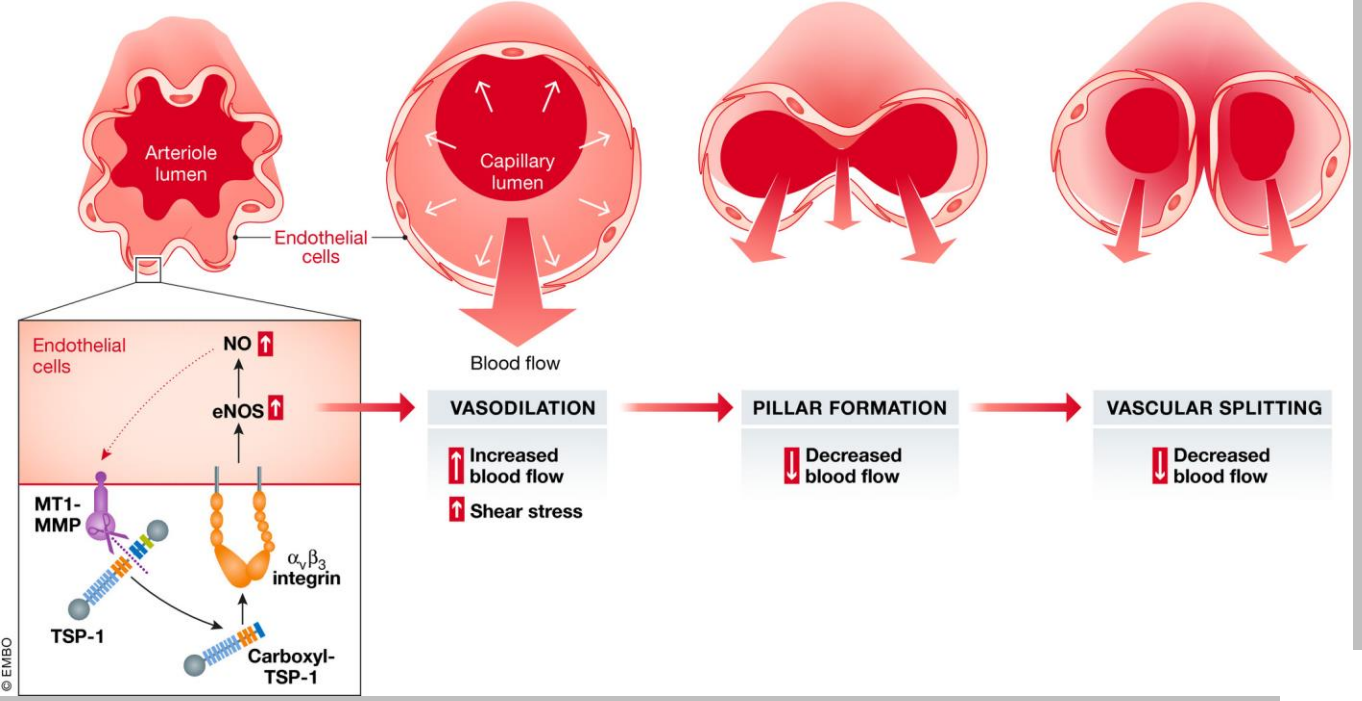
Different type of lung presentation: big issue needing a lot of conversation =

intersusceptive angiogenesis

Vessels are supposed to grow forward, but here they

grow inside themselves

Big problem = clots



EMBO Mol Med (2020)12:e11663
https://doi.org/10.15252/emmm.201911663

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Pulmonary Vascular Endothelialitis, Thrombosis, and Angiogenesis in Covid-19

Maximilian Ackermann, M.D., Stijn E. Verleden, Ph.D., Mark Kuehnel, Ph.D., Axel Haverich, M.D., Tobias Welte, M.D., Florian Laenger, M.D., Arno Vanstapel, Ph.D., Christopher Werlein, M.D., Helge Stark, Ph.D., Alexandar Tzankov, M.D., William W. Li, M.D., Vincent W. Li, M.D., Steven J. Mentzer, M.D., and Danny Jonigk, M.D.

PERSISTENT PULMONARY SYMPTOMS - MANAGEMENT

INVESTIGATION

Repeat CXR

Pulmonary function tests

- DLCO

Oximetry with activation

MANAGEMENT/RESOURCES

Respirology consultation

Pulmonary Rehab program-where available

Very prescribed incremental activation

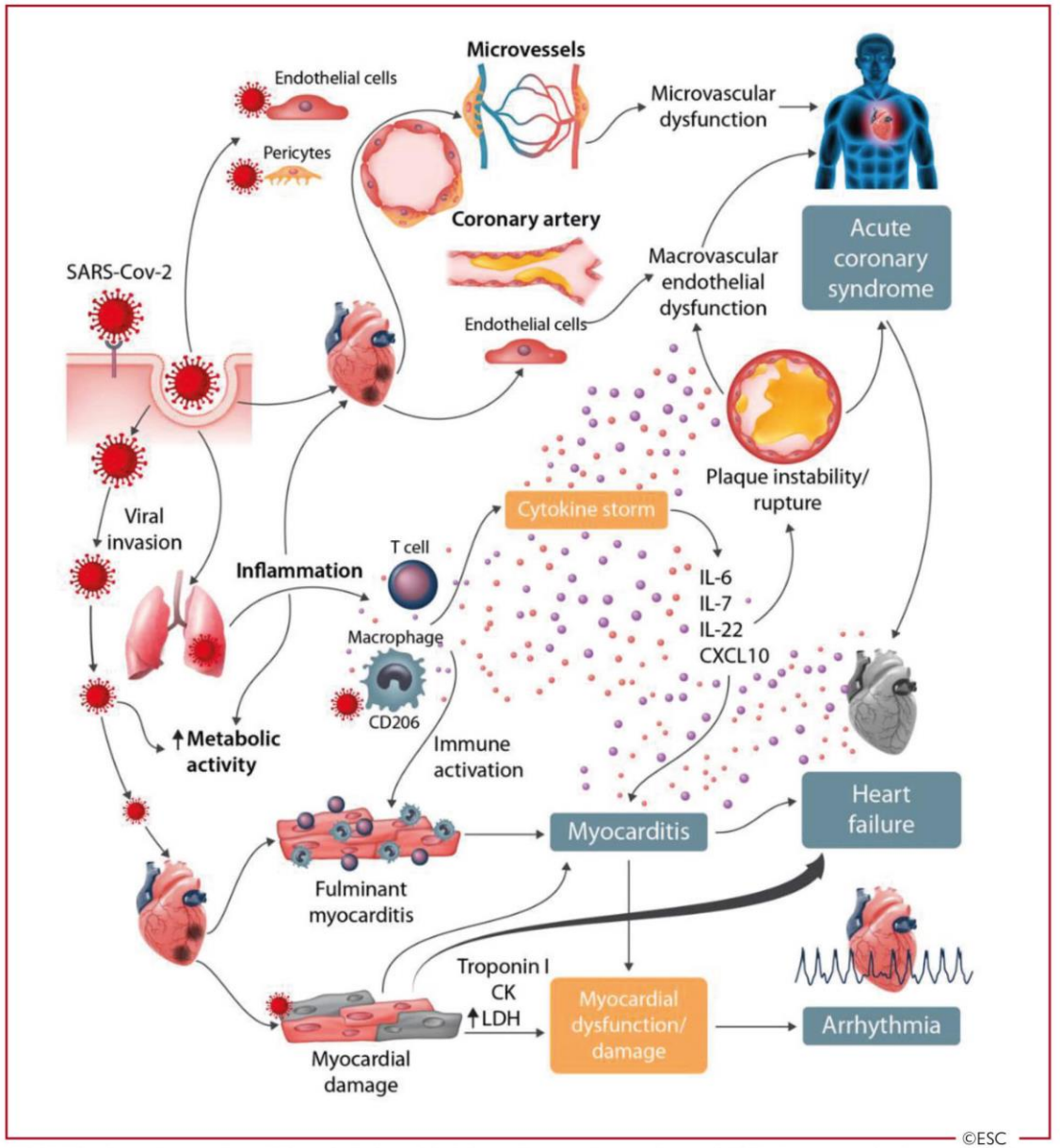
Psychologic support – virtual outreach

There are studies to suggest ongoing recovery > 3mo.

CARDIAC SYSTEM

[ESC Guidance for the Diagnosis and Management of CV Disease during the COVID-19 Pandemic (escardio.org)]

Figure 3 Cardiovascular involvement in COVID-19 – key manifestations and hypothetical mechanisms



SARS-CoV-2 anchors on trans-membrane ACE2 to enter the host cells including type-2 pneumocytes, macrophages, endothelial cells, pericytes and cardiac myocytes leading to inflammation and multi-organ failure. Infection of endothelial cells or pericytes is of particular importance because this could lead to severe microvascular and macrovascular dysfunction. In addition, immune over-reactivity can potentially destabilize atherosclerotic plaques and explain the development of acute coronary syndromes. Infection of the respiratory tract, particularly type-2 pneumocytes, by SARS-CoV-2 is manifested by the progression of systemic inflammation and immune cell over-activation leading to "cytokine storm", resulting in increased levels of cytokines such as IL-6, IL-7, IL-22 and CXCL10. Subsequently, it is possible that activated T cell and macrophages may infiltrate infected myocardium resulting in the development of fulminant myocarditis and severe cardiac damage. This process may be further intensified by a cytokine storm. Similarly, the viral invasion may cause cardiac myocyte damage directly leading to myocardial dysfunction and contribute to the development of arrhythmias. From Guzik et al., COVID-19 and the cardiovascular system - implications for risk assessment, diagnosis and treatment options. Cardiovasc Res., 2020, doi: 10.1093/cvr/cvaa106.[43]

PERSISTENT CARDIAC SYMPTOMS

Type 2 Myocardial Infarction
– common during acute phase (supply:demand mismatch)
– one-year mortality 10-25%

Stress cardiomyopathy
– during acute phase in up to 35% of hospitalized
– require follow-up imaging 4-6 weeks

Pericarditis
– Can be hard to sort out, investigation negative
– Age related changes
– Steroid and colchicine

Myocarditis up to 80%, 25 % at 3 mo
– virus can infect cardiac myocytes
– potential for acute and chronic
– acute fulminant vs latent
– Edema
– Inflammation
– Fibrosis
– Possible cause of long term cardiomyopathy

Arrhythmias

Endothelial dysfunction

Autonomic dysfunction

POST COVID-19 CARDIAC – MANAGEMENT

Anyone who had reduced Left Ventricular Ejection Fraction (LVEF) (or elevated TNT) during acute COVID infection:

– should be followed by Cardiology until EF normalizes

Anyone with symptoms post COVID of shortness of breath:

– needs an ECG, CXR & transthoracic echocardiogram

– if reduced LVEF referral to Cardiology

Anyone suffering chest pain:

– think pericarditis or ischemia

– ECG/CXR/Echo

If unsure:

CALL your Cardiologist

Rapid access clinic options - RACE/RAMEC

NEUROLOGIC IMPACTS – ACUTE (FRANCE)

Neurologic signs — no./total no. (%)	49/58 (84)
Temperature >38.5°C at time of clinical examination	8/49 (16)
Positive findings on CAM-ICU‡	26/40 (65)
Agitation	40/58 (69)
Corticospinal tract signs	39/58 (67)
Dysexecutive syndrome	14/39 (36)
Brain MRI — no./total no. (%)	
Leptomeningeal enhancement	8/13 (62)
Perfusion abnormalities	11/11 (100)
Cerebral ischemic stroke	3/13 (23)§
CSF analysis — no./total no. (%)¶	
Oligoclonal bands with the same pattern in serum	2/7 (29)‖
Elevated CSF IgG and CSF protein levels	1/7 (14)‖
Low albumin level	4/7 (57)
Negative RT-PCR for SARS-CoV-2 in CSF	7/7 (100)

58 consecutive patients admitted to ICU

84% Neurological features

PICS (POST-INTENSIVE CARE SYNDROME)
ICUAW (ICU ACQUIRED WEAKNESS)

"New or worsening impairments in physical, cognitive, or mental health status after critical illness" – 70-80%

Can exceed 10% loss of muscle mass in 1 week.

Persistent Impairments at 1 + 5 year f/u

Diaphragmatic weakness

Post-intubation dysphagia (30%)

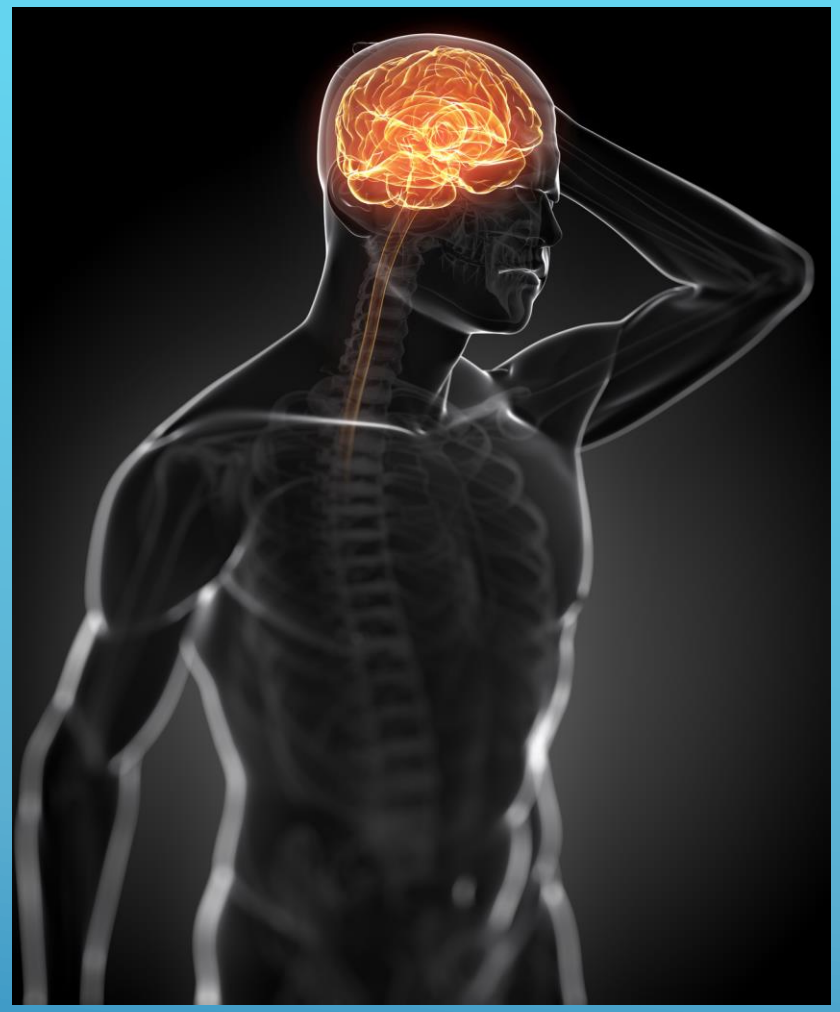
1/3 don't return to work

2 year follow up, 80% required at least one further inpatient admission (rehab or other inpatient)

Need a routine rehab follow through - blunted cognition, affective disorder, restricted level of function

Marra *et al.*, 2018 Smith *et al.*, 2020 Kress et al., 2014

NEUROCOGNITIVE



Longer duration hypoxemia association with worse cognitive impairment* (Kapfhammer et al, 2004)

Full sequelae unknown, mild-moderate patients captured?

"dysexecutive syndrome" 36%

ARDs critical illness survivors @ 2 years = 56% deficiencies in short-term memory, 29% executive function

Helms et al 2020

Herridge et al 2016

Bilotta *et al.*, 2019

Symptoms

Slower processing

Slow to respond

May get label: “Just depressed”

Paradoxic euphoria

Poor working memory

Poor divided attention/shifting attention

Poor retrieval

“Bone crushing” fatigue

Paradoxic insomnia

Depressed mood

- Reactive
- Neurobiologic

Managment

Pacing is key

Memory support strategies (Cognitive OT)

Work up for depression mimics

TSH

Nutritional screen

Chronic fatigue vs Depression – KEY QUESTION

If you woke up tomorrow and you had unlimited energy, what would you do?

ME/CFS will list dozens of things

If depressed ON TOP of ME/CFS

– manage as you would any depression

International Association for

IACFS/ME

Chronic Fatigue Syndrome/ Myalgic Encephalomyelitis

Dedicated to the care and research of people affected by ME/CFS and related disorders

Username

Password

Keep me logged in

Log In

https://www.iacfsme.org/

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ME/CFS Primer For Clinical Pracitioners

CANADIAN CONSENSUS CRITERIA OF MYALGIC ENCEPHALOMYELITIS (ME) / CHRONIC FATIGUE SYNDROME (CFS)

- Pathologic Fatigue
- Post Exertional Malaise
- Unrefreshing Sleep
- Pain (chronic widespread +)
- Neurocognitive Symptoms

  Autonomic Symptoms (difficulty standing)

  Endocrine Symptoms (temperature control)

  Immune Symptoms (flu like and sensitivities)
- = mandatory for diagnosis

MANAGEMENT OF CHRONIC FATIGUE AND MUSCLE PAIN

Living within an "energy envelope" (PMR and **OTs have expertise here . . .)**

Chunking Alternating Pacing Resting

Energy conservation techniques –

- Post-exertional myalgia (PEM) ATP-ADP System theorized
- Not "no pain no gain" to motivate exercise
- Instead "Conserve it to preserve it" a Post-polio syndrome expression

Potentially respond to neurostimulant – empirically trialled

Concept of "re-triggering old injuries"

- Concussion, Mild Traumatic Brain injury, Post-traumatic stress disorder, Sleep disorder, Anxiety disorder, Depressive disorder . . .

https://www.healthrising.org/blog/2020/09/21/lipkin-long-hauling-covid-19-b-cells-biomarkers-chronic-fatigue-syndrome/

NEW RESEARCH - TEST FOR PEM? CARDIOPULMONARY EXERCISE TEST (CPET)

› Phys Ther. 2013 Nov;93(11):1484-92. doi: 10.2522/ptj.20110368. Epub 2013 Jun 27.

Discriminative validity of metabolic and workload measurements for identifying people with chronic fatigue syndrome

Christopher R Snell [1], Staci R Stevens, Todd E Davenport, J Mark Van Ness

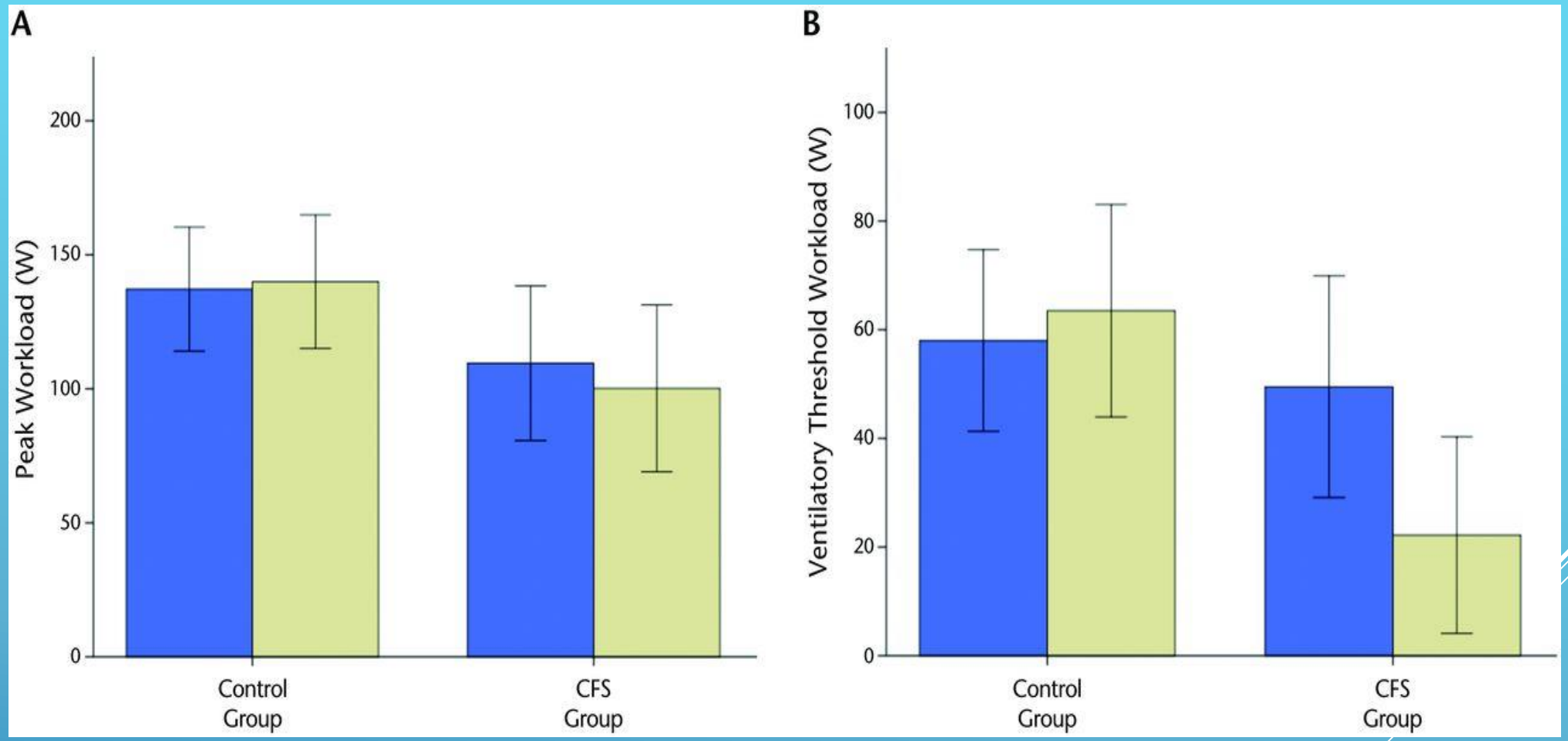
Affiliations + expand

PMID: 23813081 DOI: 10.2522/ptj.20110368

Abstract

Background: Reduced functional capacity and postexertion fatigue after physical activity are hallmark symptoms of chronic fatigue syndrome (CFS) and may even qualify for biomarker status. That these

FIGURE 2 MEASUREMENTS OF WORKLOAD AT PEAK EXERCISE (A) AND AT THE VENTILATORY THRESHOLD (B) IN PARTICIPANTS WITH CFS



Phys Ther, Volume 93, Issue 11, 1 November 2013, Pages 1484–1492, https://doi.org/10.2522/ptj.20110368

U.S. ME/CFS MYALGIC ENCEPHALOMYELITIS CHRONIC FATIGUE SYNDROME CLINICIAN COALITION

ABOUT ME/CFS CLINICAL MANAGEMENT MEDICAL EDUCATION RESOURCES ABOUT US

U.S. ME/CFS CLINICIAN COALITION

Resources for Medical Providers Caring for People with Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

https://mecfscliniciancoalition.org/

PSYCHOLOGIC SEQUELAE

Dr. Katie Wiltshire, MD, MHA, FRCPC

(Partnership between Integrated Quality Management, Calgary Zone Patient & Family Centred Care, and Primary Data Support, Analytics. Calgary Zone Patient & Family Centred Care)

Calgary post-ICU survey: very positive survey of experiences

Emotional / Psychologic toll

80-90% access to a phone, mattered

Isolations cited

Positive staff patient support experienced

Steroid can have a confounding effect

Psychiatric PTSD – multiple primary care resources

Harvard Psychopharmacology Algorithm for PTSD: http://psychopharm.mobi/algo_live/

"Even though I was on sedation I could hear their voices and know they were taking care of me."

"ICU nurses, they are so excellent, they are angels really"

"The only thing that filled my mind is to communicate with my family out of the country but I wasn't able to communicate because my phone died and no charger. Even my last words to my family, especially my mom, but I can't because my phone has no charger."

"Really scary and uncomfortable with all the equipment hooked up to me. I thought I was going to die. But nothing to do with the nurses and doctors, they were really good. Just for me, was a nightmare."

"During this stay you see very few people and when you see the hospital staff they are always in full gear and it gives you a bit of anxiety."

British Society of Rehabilitation Medicine

Promoting quality through education and standards

REHABILITATION IN THE WAKE OF COVID-19

A PHOENIX FROM THE ASHES

Rehabilitation of the individual

Rehabilitation of the health care system

covid-19bsrmissue1-published-27-4-2020.pdf

MONTEFIORE EXAMPLE OF EXERCISES:

Table 1: Sequence of Exercise Progression

Level 1	These exercises are suitable for a patient who is very weak and has to lie down most of the time. • Start with the breathing exercises (exercises 1-3) done at least twice a day, and increase to 4-6 times a day • Gradually, add the other exercises as tolerated. You can do a few of the different exercises at each session • Once you can do all the exercises in one session without any difficulty, repeat them 2-3 times a day
Level 2	Once the patient can complete level 1 exercises with ease, proceed to level 2, which are mainly seated exercises. • Continue with level 1 exercises • Start with a few of the exercises in Level 2 • Gradually increase the number of exercises that can be done at each session • Increase to repeating the exercises 2-3 times a day
Level 3	Once the patient can complete level 2 exercises with ease, proceed to level 3, which are mainly standing exercises • Continue with level 1 and 2 exercises • Start with a few of the exercises in Level 3 • Gradually increase the number of exercises that can be done at each session • Increase the numbers of sessions as tolerated. The goal is to do this 2-3 times a day

Table 2: LEVEL 1 EXERCISES

Deep breathing exercises	2 minutes	Aerating the lower parts of the lung
Pursed lip breathing exercises	2 minutes	Exercising the breathing muscles
Blowing exercises	10 times	Exercising the breathing muscles
Ankle pumps	Repeat 2-3 times. Increase gradually to 8 times (1 set)	Improve leg circulation. Prevent ankle contractures
Hip and Knee Bends	Repeat 2-3 times. Increase gradually to 8 times (1 set)	Maintain hip and knee range of motion
Crossing your legs in bed	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain hip external rotation
Overhead arm stretch	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder abduction and extension
Touching back of neck	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder external rotation
Touching upper back	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder internal rotation
Sitting side of the bed	As long as tolerated	Improve sitting balance. Reduce postural dizziness
Sit to Stand	10 times(1set)	Improve ability to get up
Relaxation	10 minutes	

RESOURCES FOR POST-COVID SEQUELAE

United Kingdom sites: "Long COVID Recovery"

For Patients: https://www.yourcovidrecovery.nhs.uk/

For Physicians https://www.bmj.com/content/370/bmj.m3026

Our company Ed

thebmj covid-19 Research Education News & Views Campaigns

Practice » Practice Pointer

Management of post-acute covid-19 in primary care

BMJ 2020 ; 370 doi: https://doi.org/10.1136/bmj.m3026 (Published 11 August 2020)
Cite this as: *BMJ* 2020;370:m3026

BMJ talk medicine
What Do We Know About Long Covid

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Research About Feedback Contact

Your COVID Recovery

What is COVID-19? Managing The Effects Your Wellbeing Your Road To Recovery NHS

Supporting your recovery after COVID-19

As you find yourself recovering from COVID-19 you may still be coming to terms with the impact the virus has had on both your body and mind.

These changes should get better over time, some may take longer than others, but there are things you can do to help.

Your COVID Recovery helps you to understand what has happened and what you might expect

thebmj Visual summary

"Long covid" in primary care

Assessment and initial management of patients with continuing symptoms

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

An uncertain picture

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

Investigations

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

Blood tests

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

Other investigations

- Chest x ray
- Urine tests
- 12 lead electrocardiogram

Clinical assessment

Full history
From date of first symptom

Current symptoms
Nature and severity

Examination, for example:

- Temperature
- Heart rate and rhythm
- Blood pressure
- Respiratory examination
- Functional status
- Pulse oximetry
- Clinical testing

If indicated

Managing comorbidities

Many patients have comorbidities including diabetes, hypertension, kidney disease or ischaemic heart disease. These need to be managed in conjuntion with covid-19 treatment. Refer to condition specific guidance, available in the associated article by Greenhalgh and colleagues

Assess comorbidities

Social and financial circumstances

Social, financial, and cultural support

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

Safety netting and referral

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

- Worsening breathlessness
- PaO_2 < 96%
- Unexplained chest pain
- New confusion
- Focal weakness

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

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

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

Medical management

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

Self management

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

- Diet
- Sleep
- Quitting smoking
- Limiting alcohol
- Limiting caffeine

Mental health

In the consultation:

- Continuity of care
- Avoid inappropriate medicalisation
- Longer appointments for patients with complex needs (face to face if needed)

In the community:

- Community linkworker
- Patient peer support groups
- Attached mental health support service
- Cross-sector partnerships with social care, community services, faith groups

thebmj Read the full article online https://bit.ly/BMJlong

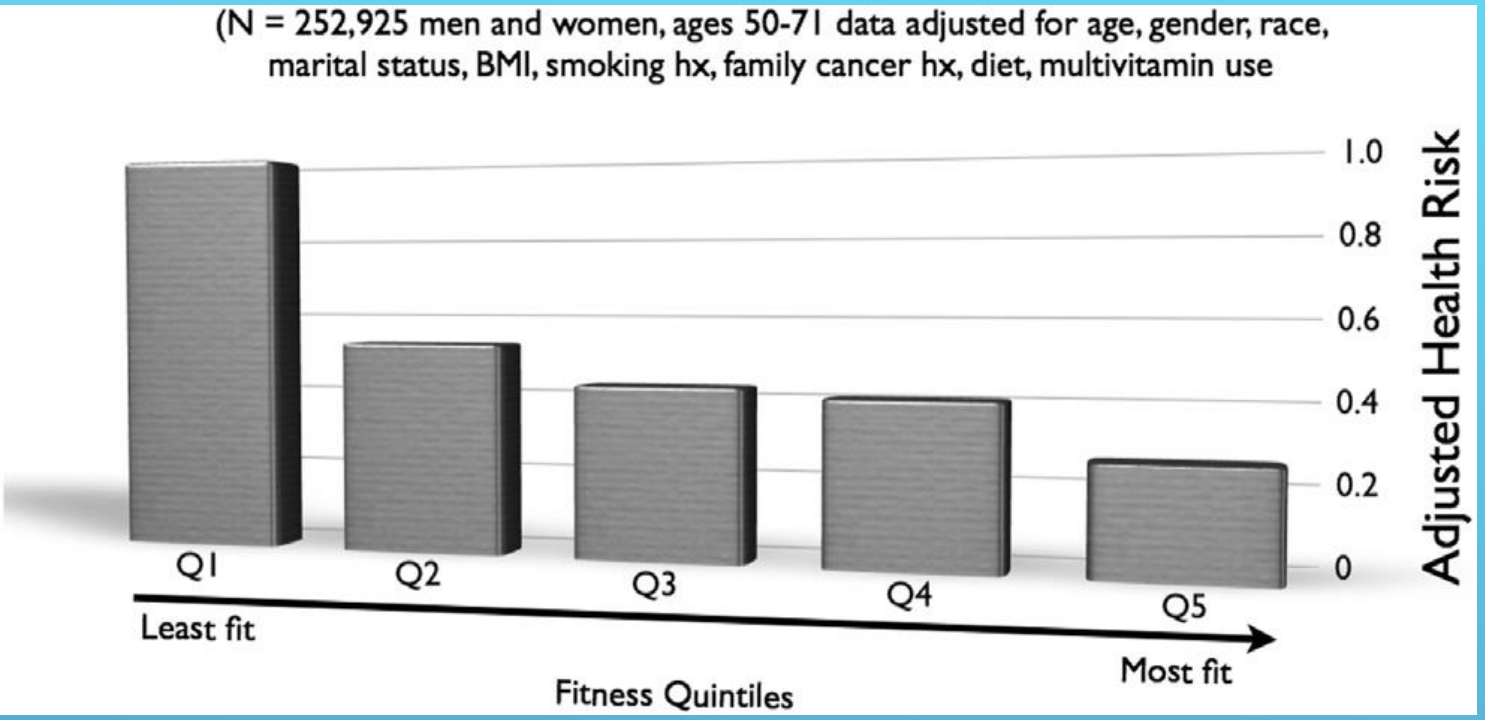
See more visual summaries http://www.bmj.com/infographics

n drawing plans to put UK on o
t to fight COVID-19

easures to counter obesity, UK Prime Minister Bori
r use of bariatric surgery to reduce the impact of CO

ineshwori | | Published: June 29, 2020 12:20 pm

THE BEST REHABILITATION…



. . . might be "pre-habilitation"

WWII soldiers

Anesthetic risk cardiopulmulmonary rehab for high risk

Physical activity and *health*. Ann Epidemiol 2009;19:253-256.

Julie K. Silver: Prehabilitation could save lives in a pandemic, March 19, 2020

Davenport T, Rundall How Can Physical Therapists Enge the Social Ecolgy of Health to Mitigate Service Disruptions in a Post-COVID World? Cardiopulmonary Physical Therapy Journal. 2021 April V32 pp 54-57.

WHAT'S NEXT ?...?

IN ADDITION TO WORRYING ABOUT THE BIG 2ND ACUTE WAVE AND VACCINATIONS

The "Long Haulers"

- Recognition
- Treatment
- Support

New ways to reach out and treat

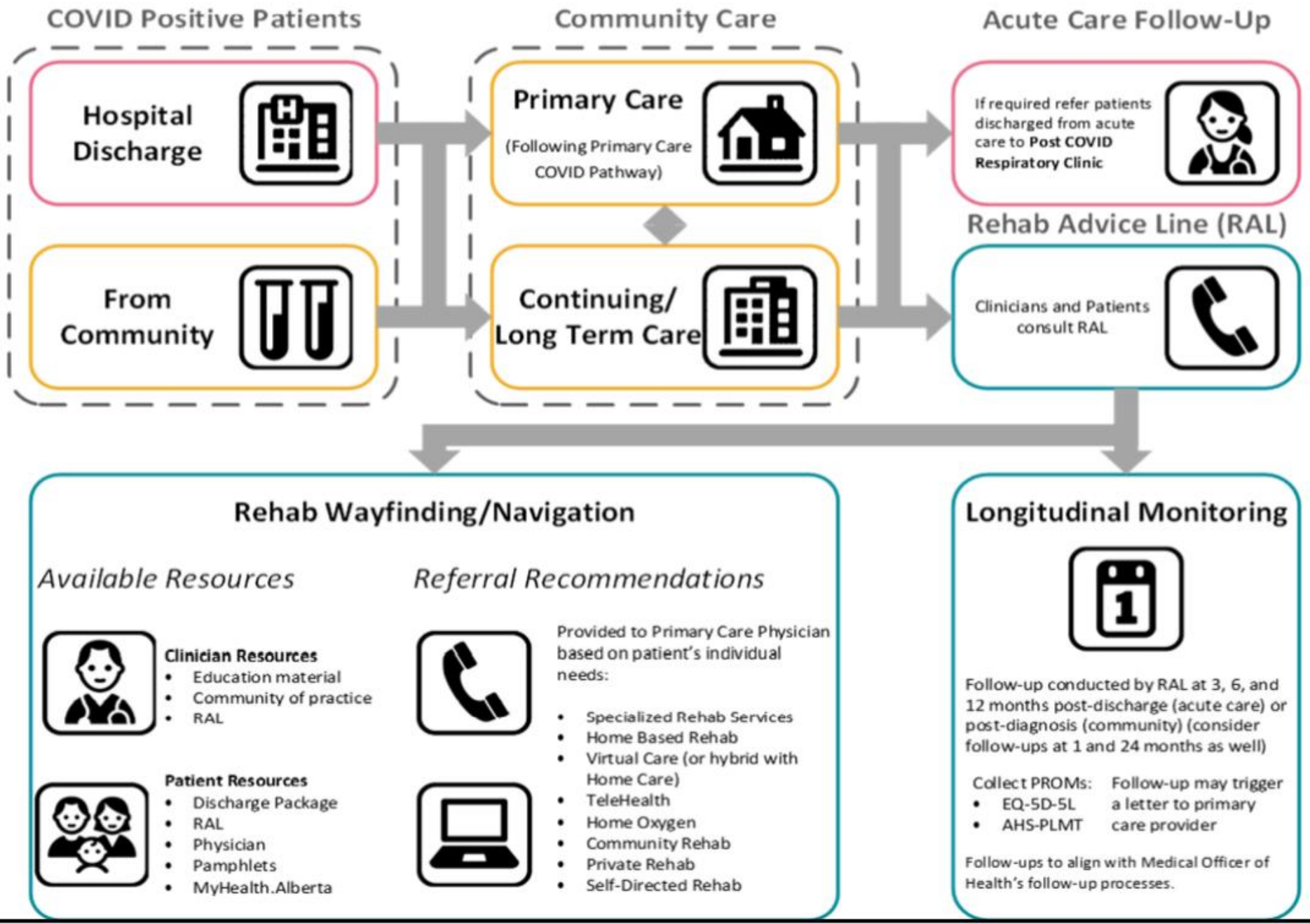
- Virtual medicine
- Virtual rehab

New planning levels:

- City and local initiatives
- Provincial and National CDC directives
- Population health initiatives

NeuroRehabVisionSCN@ahs.ca

COVID19 Rehab: Community Care Flow



BC POST-COVID-19 CLINIC DEVELOPMENTS

Vancouver CoastalHealth | one VCH

Vancouver Acute Administration
855 W. 12th Avenue
Vancouver, BC V5Z 1M9
604 875 4999

Memorandum

Date: January 22, 2021
To: All Vancouver Acute staff and physicians
From: Cori Ross, Director, Ambulatory Care, Vancouver Acute
Dr. Zachary Schwartz, Physician Leader, Post-COVID Recovery Clinic
Ben Fischer, Patient Services Manager, Ambulatory Care, Vancouver Acute
Cc: Michelle de Moor, Interim Vice President, Vancouver Acute Services
Dr. Marcel Dvorak, Senior Medical Director, Vancouver Acute Services
Dr. William Henderson, Chief Medical Officer, COVID-19 Vancouver Acute Emergency Operations Centre
Lori Korchinski, Director, COVID-19 Vancouver Acute Emergency Operations Centre

Re: VGH Post-COVID-19 Recovery Clinic opens

BC POST-COVID-19 CLINIC DEVELOPMENTS

8565 (BCHA.0186) Post-COVID-19 Recovery Clinic Referral (R. Dec 16-20)Fillable[15851].pdf (providencehealthcare.org)

Print | Clear Form

Attach Patient Label Here

POST-COVID-19 RECOVERY CLINIC REFERRAL

* 8 5 6 5 *

Referral Other

Referral Date: _____

NOTE: *Referrals will only be accepted for **confirmed** COVID Positive patients or Official Epi-Linked Cases (refer to BCCDC). The Post-COVID-19 Recovery Clinics are designed to see patients at **3 or more months post-symptom onset**. This referral is **NOT** for cases requiring urgent care.*

This referral will be triaged (see below). We will inform patients of any scheduled appointments. For specific wait times, please refer to Pathways. If you require further support or have questions regarding your post-COVID patient, please request advice from "COVID – GIM Post Infection Care" via the RACE app: http://www.raceconnect.ca/race-app/

REFERRING CLINICIAN

Name: _____ MSP Number: _____

Phone: _____ Fax: _____

Email Address: (to participate in care conferencing-*billing code #14077*) _____

FAMILY PHYSICIAN: (if different from referring clinician) _____

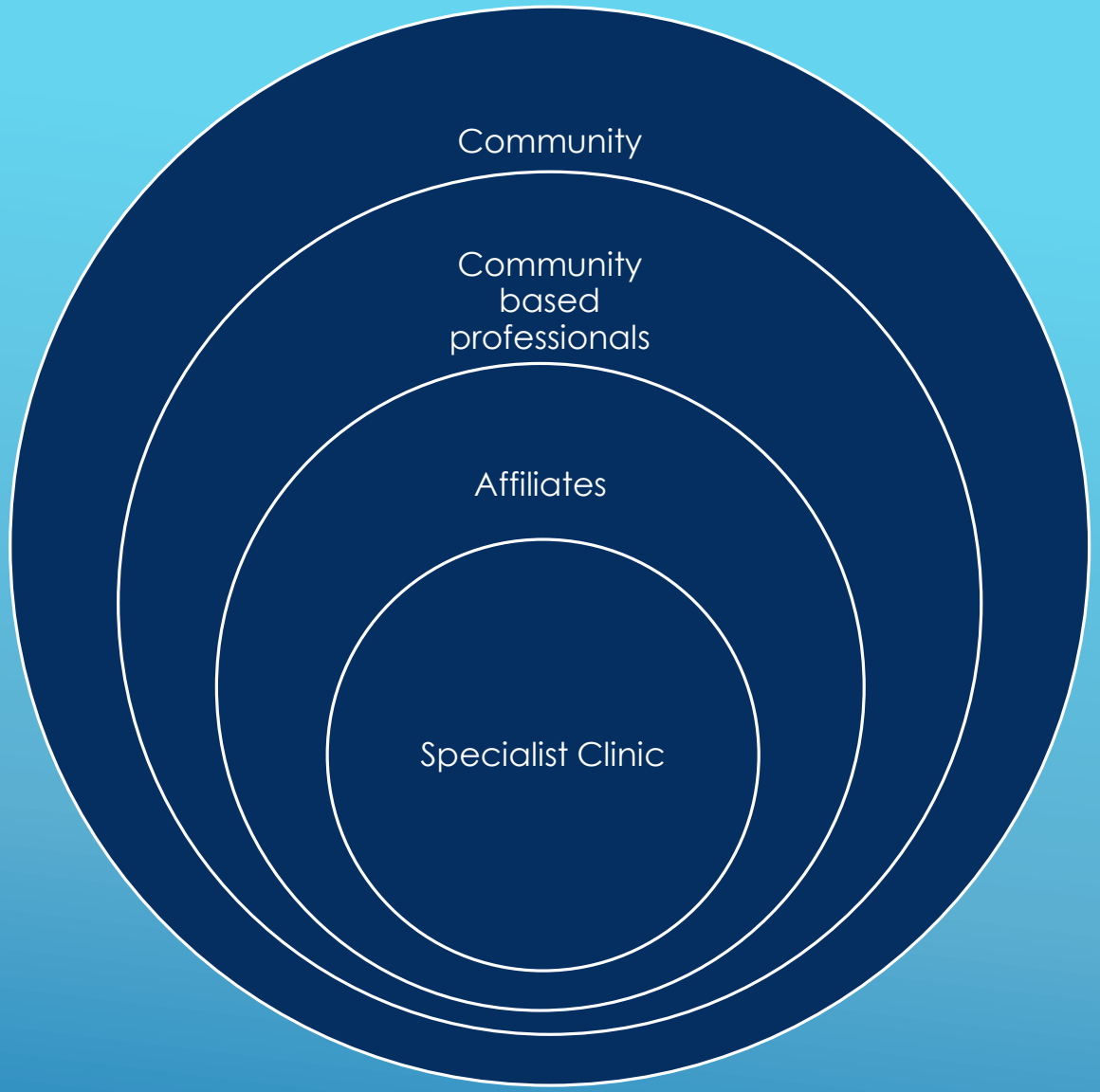
MSP Number: _____ Phone: _____ Fax: _____

POST-COVID CLINICS - CANDIDACY

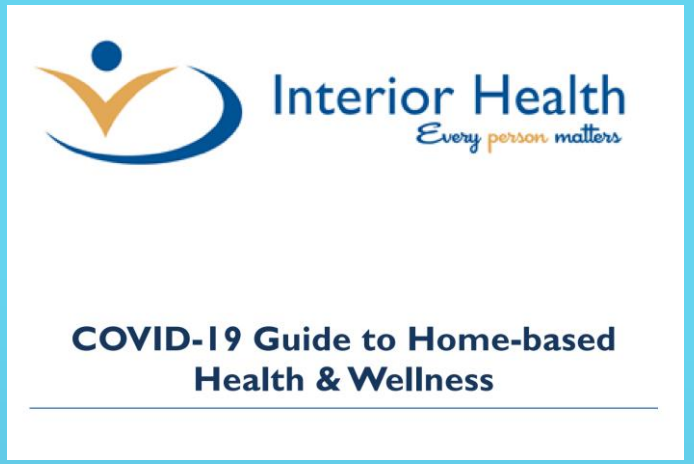
REASON FOR REFERRAL (this will be used for Triage purposes)

Category A	Category B	Category C
☐ Hospitalization for COVID-19 ☐ 2 or more ER presentations following diagnosis of COVID-19 ☐ New evidence of end organ impairment without identifiable cause: (check all that apply) ☐ cardio ☐ neuro ☐ resp ☐ renal ☐ musculoskeletal	☐ NYHA dyspnea scale 3 or higher (new finding) ☐ Inability to return to work or school post diagnosis of COVID-19 for 12 or more weeks ☐ Functional deterioration post diagnosis of COVID-19 (dependence on ADLs or iADLs) for 12 or more weeks	☐ Unexplained, persistent symptoms for more than 12 weeks post symptom-onset, thought to be related to COVID-19

FUTURE DIRECTIONS? WHAT MODEL FOR POST-COVID-19 CARE FOR BC?



REFERENCES FOR MANAGEMENT



https://www.interiorhealth.ca/YourEnvironment/CommunicableDiseaseControl/covid19/IH-PH-COV-506%20COVID-19%20Guide%20to%20Home-Based%20Health%20and%20Wellness.pdf

www.nice.ore.uk/guidance/ng188

https://www.selfmanagementbc.ca/

https://ecme.ucalgary.ca/covid-19-cme-resources/covid-corner/

www.survivorcorps.com

bma-covid-tracker-survey-full-results-aug-2020.pdf

Ambrose, AF. Montefiore Patient and Caregiver Guide to Managing Covid 19 Patients at Home. Montefiore Medical Center, Version 3: March 28, 2020.Version 3

United Kingdom sites: "Long COVID Recovery"

For Patients: https://www.yourcovidrecovery.nhs.uk/

For Physicians https://www.bmj.com/content/370/bmj.m3026

https://mecfscliniciancoalition.org/

UBC CPD site: The Journey to Recovery: Post-COVID-19 Care in BC

Webinar Series | UBC CPD

https://www.providencehealthcare.org/sites/default/files/8565%20%28OP172%29%20Post-COVOD-19%20Recovery%20Clinic%20Referral%20%28R.%20Nov%2017-20%29fillable.pdf

Thousands of COVID-19 Long-haulers Are Still Sick - The Atlantic

IACFS/ME Primer for Clinicians https://www.iacfsme.org/

ABBREVIATED REFERENCES IN SLIDES:

N Engl J Med. 2020 Apr 15. Neurologic Features in Severe SARS-CoV-2 Infection. University of Strasbourg, Strasbourg, France. Julie Helms, M.D., Ph.D. Stephane Kremer, M.D., Ph.D.

Intensive Care Med. 2016 May;42(5):725-738. doi: 10.1007/s00134-016-4321-8. Epub 2016 Mar 30. Recovery and outcomes after the acute respiratory distress syndrome (ARDS) in patients and their family caregivers.

Herridge MS1, Moss M2, Hough CL3, Hopkins RO4,5,6,7, Rice TW8, Bienvenu OJ9, Azoulay E10.

Crit Care. 2019 Aug 6;23(1):273. doi: 10.1186/s13054-019-2546-y.

Harmful effects of mechanical ventilation on neurocognitive functions.

Bilotta F1, Giordano G2, Sergi PG2, Pugliese F2.

James M Smith, Alan C Lee, Hallie Zeleznik, Jacqueline P Coffey Scott, Arooj Fatima, Dale M Needham, Patricia J Ohtake, Home and Community-Based Physical Therapist Management of Adults With Post-Intensive Care Syndrome, *Physical Therapy*, , pzaa059, https://doi.org/10.1093/ptj/pzaa059 Published: 13 April 2020 Crit Care Med. 2018 Sep;46(9):1393-1401. doi: 10.1097/CCM.0000000000003218.

Co-Occurrence of Post-Intensive Care Syndrome Problems Among 406 Survivors of Critical Illness. Marra A[1,2], Pandharipande PP[3], Girard TD[4], Patel MB[5], Hughes CG[3], Jackson JC[1,6,7,8], Thompson JL[9], Chandrasekhar R[9], Ely EW[1,6,10,11], Brummel NE[1,6,11].

Kress JP, Hall JB (2014) ICU-acquired weakness and recovery from critical illness. N Engl J Med 371(3):287-288 Fan et al, 2014

REFERENCES FOR EXERCISE AND ACTIVATION

ACTIVITY RESOURCES:

Now that many of us find ourselves isolated at home, cut off from each other and more sedentary than usual, movement has become more important than ever.
Follow the Link below for **Physical Literacy at Home** and ways to get moving.
https://sportforlife.ca/facing-covid-19-together/

Cycling Canada is excited to explore new avenues with the launch of its new blog Shifting Gears, which will give a voice to the Canadian cycling community to address various issues and experiences, as well as learn from leaders of the industry on a variety of topics during these uncertain times.
CYCLING CANADA SHIFTING GEARS

GENERAL EXERCISE:

UBC recreation – Get Active At Home
https://recreation.ubc.ca/get-moving/active-at-home/?_ga=2.12930231.144655773.1586641631-960679141.1581867524

Canadian Society for exercise physiology
https://csepguidelines.ca/

General activity in small spaces – multiple difficulty levels, including cardiovascular, HIIT, yoga, many free resources, good for self-directed and minimal equipment
https://www.fitnessblender.com/

Strategies and Actions for Independent Living – home activation program

Level 1: Sitting - SAIL Home Activity Program

www.interiorhealth.ca › Forms › 821142.pdf · PDF file

Level 2: Standing - SAIL Home Activity Program

www.interiorhealth.ca › Forms › 821143.pdf · PDF file

Level 3: Moving - SAIL Home Activity Program

www.interiorhealth.ca › Forms › 821144.pdf · PDF file

REFERENCES FOR EXERCISE AND ACTIVATION

KAMLOOPS SPECIFIC GROUPS:
Ways to stay Active in our Community!!

F3FIT
Check out their YouTube Channel for great online workouts.

SPORTBALL KAMLOOPS
2 videos per week for 15-20 mins fitness videos on Facebook for kids to get them and keep them active with Coach Marvin.

YOGA NOW KAMLOOPS
All of our classes are all-levels, beginner friendly and are accessible anytime on their Facebook page for free. You can schedule your yoga time and get the movement and stress relief you need whenever it suits you. They will continue to share 2-3 new classes each week.

KAMLOOPS YMCA
YThrive Home will help you get your daily dose of YMCA fitness and community with amazing workouts! Workouts are designed for almost any fitness level and can be done from your living room for FREE.

NIKE TRAINING CLUB
Over the coming weeks, they'll provide you with workouts, nutrition advice and expert help, so we can all come back from this stronger than ever. Join in with a community of living room athletes. NTC Premium normally comes at a cost, but they have opened it up for free until further notice.

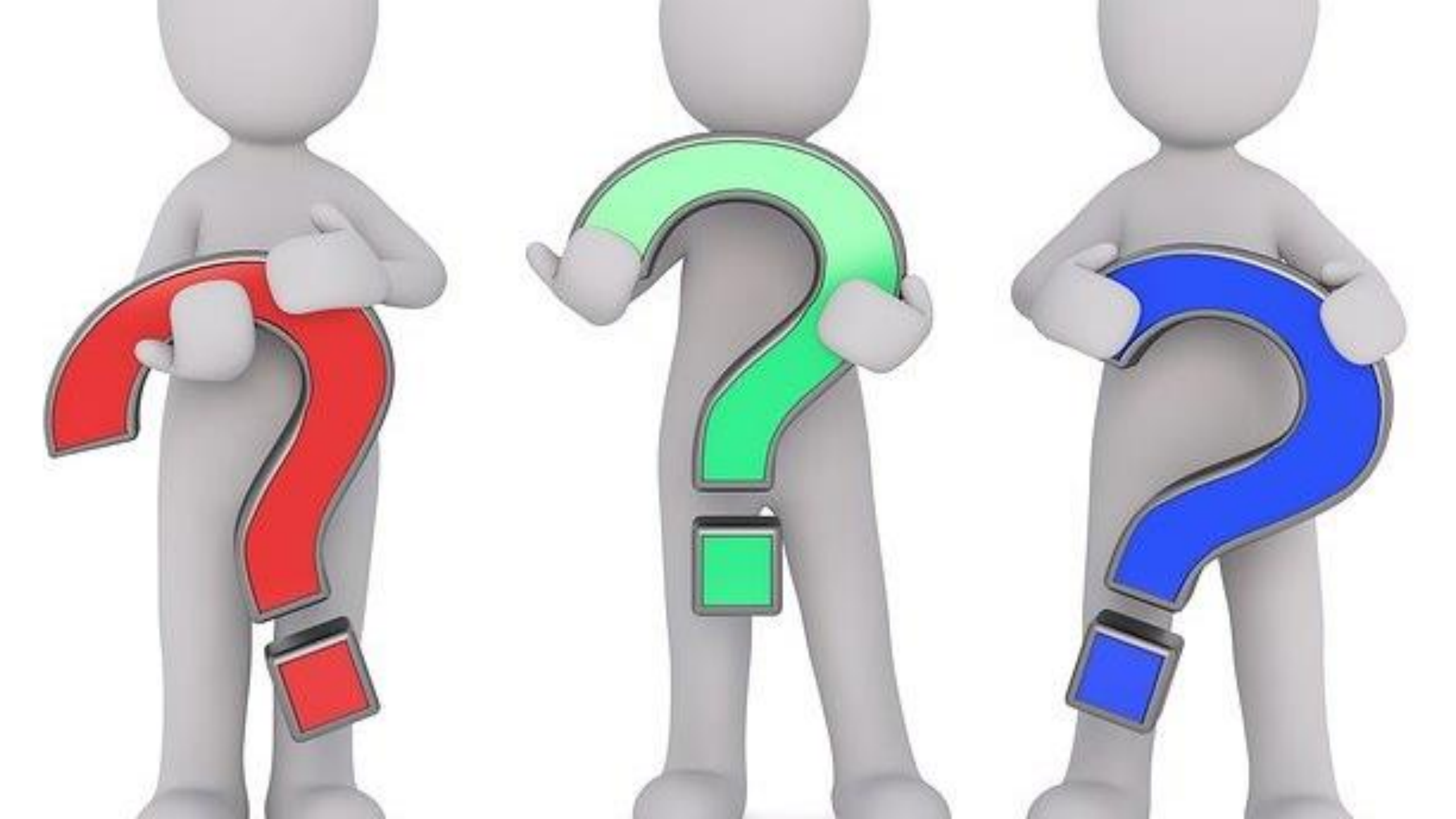
KAMLOOPS FIT CENTER
Everyday live at 10:00 am on the Kamloops Fit Center Instagram, you can tune in live to free fitness classes (or by donation) to stay in shape and active during these times. Classes are available for 24 hours before their expire.

OXYGEN KAMLOOPS
Daily classes on their Facebook page with yoga, meditation, and fitness classes to choose from.

ANYTIME FITNESS
Providing virtual workouts live on Facebook weekdays at 6:30 am PST.

K SPIN
Providing daily free virtual spin classes by signing in through the Mind body app and then joining in through Zoom. Weekdays at 5:30 pm and weekends at 9:30 am. All classes are saved on their community Facebook page to be able to access and use anytime.

BARRE KAMLOOPS
Providing daily Barre classes on their Facebook community page.



HYPER-COAGUABLE THEME:

- "COVID-toes"
- DVTs and PE's – Dutch study
- Reports of amputations – rarer
- Notice to BC Physicians as a reportable constellation in children and adolescents
- MISC syndrome warning

Luigia Brugliera et al., 2020 Kloka et al, 2020 Canadian Press, April 23, 2020 Denver Channel

PAEDS ISSUES

Proving MISC is a challenge

Multiple overlap with Kawasaki

Little information about the long haul of hyperinflammation cases

Hard for families to go through the workup and overlap with conjunctivitis, creates a lot of anxiety

Some of symptoms unknown relations

NP swabs are negative

Chronic hives

Need more research on the MISC cases for the probable longer symptoms that might be experienced

Parents describe children a being fatigued and not themselves

Translation of the adult symptoms, but far less data

Severe phenotype is not as clear cut as it should be.

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